

Hines Perspectives: Life Sciences

The Potential of Purpose-Built Properties

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Contents

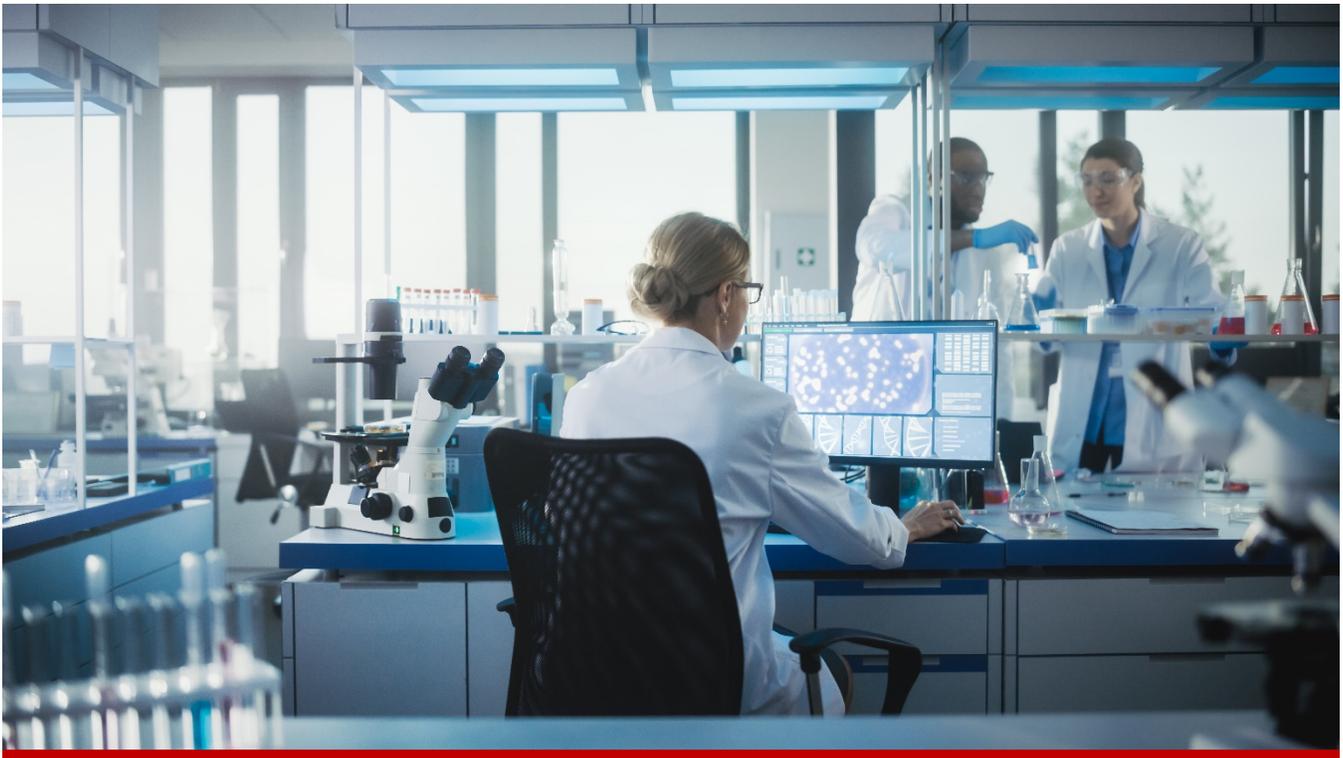
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Introduction

The COVID-19 pandemic put extraordinary pressure on life science companies as they raced through new trials and created vaccines to protect the public. The increasing demand for innovation and “near-instant” results also put pressure on the very properties where those scientists work. Life science offices, labs and facilities around the world needed to serve increased production demands and a broader purpose: global public health on a massive scale.

While the pandemic has put heightened focus on life sciences as an industry, the commercial real estate industry had already been grappling with increasing demand for space from the life science sector, including what space is needed, and how those demands would impact the built environment and those who invest in it. Momentum continued in the sector in 2021, with a record amount of investment from public and private institutions into life science properties and portfolios.

This paper introduces the global landscape for life science real estate and attempts to put the context for investment in perspective. We also share our vision on the potential of purpose-built life science development. Finally, we’ll reveal our proprietary analysis on the sector with a specific emphasis on the U.S. market, including the potential size of the investment opportunity.





Levit Green – Houston

Overview of the life science landscape

Defining the Global Market

The life science industry can be divided into three different stages: basic research, translational research and patient delivery.

1. Basic research is focused on discovery. Discovery occurs at the beginning of the cycle when a scientist or academic researcher may have an idea for a new treatment or device.
2. The next stage in the cycle is translational research, which is the process of testing and approving a medical intervention for people. The goal is commercialization. Some of the companies that fall into this group include pharmaceuticals, biotechnology, medical devices, contract research organizations, and manufacturing and logistics.
3. Patient delivery becomes the last step of the cycle, when a drug is available in the market.

Life Sciences Cycle: From Lab Bench to Patient Bed



The immediate opportunity we see to target is the traditional laboratory space, that serves the first two phases of the life science lifecycle.

Megatrends Facing the Industry

In addition to the exogenous changes to the life science industry, there are significant trends within science that are driving forward how the industry functions – and helping define what kinds of laboratory spaces are needed in the future. These include breakthrough gene therapies, a data revolution and value-based, patient-centered healthcare.¹

To the **first trend of novel gene therapies**: Nearly four years ago the U.S. Food and Drug Administration (FDA) approved a gene therapy product called Luxturna, created by Spark Therapeutics, to treat patients with a rare form of inherited vision loss.² **Gene therapy** is a technique that modifies a person's genes to ultimately treat, or cure, diseases. There are more than 100 orphan diseases that cannot be successfully treated with traditional therapies. Gene-editing tools like CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) can help not only improve existing therapies for patients, but also help find drug targets, and test new drug candidates – enabling better care for a broad spectrum of diseases. CRISPR-related technologies are transforming not only outcomes for patients but also how scientists conduct research. The biomanufacturing of gene therapies is radically different from traditional, pill-based drugs and requires different types of space.³ And, with new ways of producing therapies, increasingly life science companies are looking for cGMP (Current Good Manufacturing Practice) space for biomanufacturing on-site to test as well as potentially enter pre-production before commercial scale.

The **second major trend** that is taking place in the space is the **integration of data and digital innovations** into the industrialization of drug discovery. Pharmaceutical and biotechnology companies are leveraging large, complex, in-house datasets to complete computational analysis that rapidly identifies novel therapeutic candidates. Through advancements in science, using quantum computing, inefficient trial-and-error processes may replace automated, engineering-driven approaches. Further, changes in treatment patterns that integrate digital solutions such as wearables and other digital technologies are increasingly in the mix.

A **final significant trend** that is shifting the market is the move towards value-based, **patient-centered healthcare**. Increasingly, there are pressures on companies to shift not only the types of products but also the risks one might pursue when it comes to healthcare. Value in healthcare can be defined as the quality of care (typically measured by patient outcomes) modified by costs.⁴ Thus, there is a desire for innovative care models and patient-centered solutions to ensure that value-based care aligns with patient-centered care—the greater consideration of patient outcomes. The pressures facing pharmaceutical and biomedical companies in the life science industry are driven by patient-centered care. Thus, the need to focus more on patient outcomes, perspectives and preferences is critical in the life science industry and can influence what types of research, and what types of risks, companies are willing to take to ensure this alignment.⁴

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¹ U.S. Food and Drug Administration, "What is Gene Therapy," July 2018.

² U.S. Food and Drug Administration, "FDA Approves Novel Gene Therapy to Treat Patients with a Rare Form of Inherited Vision Loss," December 2017.

³ Forbes, "How CRISPR Gene Editing Is Revolutionizing Medicine and The Companies Who Invest in It," June 2018.

⁴ National Library of Medicine, "Value Based Care and Patient-Centered Care: Divergent or Complementary?" August 2016.

Clusters Count on Critical Factors

To continue producing innovative outcomes, life science companies tend to cluster their facilities near companies with academic approaches or research methodologies that may contribute to the production of treatments through collaboration.

While many global cities seek to attract life science companies to grow clusters and economic development in tandem, **many different factors need to be present** for a life science cluster to thrive. Access to talent tops the list of requirements, along with established academic institutions and life science companies, access to capital, and a high quality of life for employees who are high in demand. Assessing markets for their talent availability when the war for talent is exceedingly high within the industry is critical.

Biotechnology and pharmaceutical companies compete for talent with highly specialized science and technology skillsets. Often to obtain the skills required, employees will pursue post-graduate or doctoral degrees. By the time they have been in the workforce for a few years, much of the potential talent is established within a city and may not be keen to relocate. Because the craft of these individuals is in short supply, employers must come to them, which has led life science companies to cluster around renowned research institutions.

To successfully test treatments that make it through clinical trials, there must be a steady flow of patients. For many therapies, this happens through the leverage of local institutions with access to patients (though not always). Patients want treatments by the best doctors with the newest equipment and most advanced surgical procedures. These can be found at the best institutions. San Francisco in California, Mainz in Germany and Basel in Switzerland are examples of cities that excel in this area.⁵ Their healthcare infrastructure, with high numbers of hospitals and hospital beds, creates an ideal environment to prioritize innovation and discovery.

Another factor associated with life science clusters is funding. Our in-house research arm conducted a proprietary analysis and determined that funding is in most cases a key driver of demand growth.⁶ Only a decade ago, government funding exceeded venture capital; however, since 2013 venture capital investment has accelerated and increasingly is making up a larger share of the capital targeted towards the life science industry. Cities with an active venture capital ecosystem should be well-positioned to outperform their lacking peers.

⁵ Savills Research, Science Cities, As of February 2021.

⁶ MoneyTree, NIH, NSF, Hines Research, As of 2021Q1.



Designing purpose-built, life science spaces

Critical Design Elements for Future-Proof Life Science Assets

In the current competitive environment, with demand for life science space in full force, it may seem the road to returns would lean toward repurposing existing traditional office or retail property. However, unless the developer optimizes the space with two fundamental criteria—structural specification and the balance of lab and office space, it will be difficult to compete with purpose-built lab space.

Most alternative commercial properties were not constructed to become a lab space that features product-specific requirements, including redundant emergency power systems, higher floor-to-floor heights, higher floor load capacity, sufficient vibration capacity, superior HVAC systems and planned vertical MEP expansion.

With these considerations top of mind for developers, investors and occupiers alike, ESG also becomes an important consideration for life science assets. Especially given the heightened energy demand of these assets. Building highly efficient assets that source from sustainable energy sources as well as considering embodied and operational carbon emissions should be key in competing for the most sought-after tenants.

Carbon considerations: Life Science Sector

Life science assets with traditional lab space have the greatest diversity of loads of all our product types, and thus the greatest opportunity to reduce overall building consumption by implementing a circular infrastructure. While it might not be able to reach the level of efficiency of office or other product types, the possibility of reducing fossil fuel heating loads is the greatest. Examples in the Nordics show a 95% reduction in heating energy near the arctic circle.⁷

Due to the increased floor loading capacity and mechanical system requirements embodied carbon reduction measures have become even more important. Given embodied carbon stays with the developer and does not get transferred at the time of sale, this is something Hines and our investors will need to consider and make a concerted effort to reduce.

There is also more variability in energy consumption than our standard product types due to the varying use intensities so it will be hard to predict how an asset will perform over time and there is no set data on what a net-zero pathway looks like for life science. Digitization of our infrastructure will also be most important for our ESG agenda.⁸

⁷ Urbs.systems – Nordic based research group.

⁸ Michael Izzo, Carbon Officer, Hines.

Life science tenants frequently require the use of heavy high-tech equipment. Their lab space should have the ability to accommodate a live load of at least 100 lbs./SF. Additionally, critical experiments can be impacted by vibration, which can negate results. Given the importance of accuracy, the presence of unwanted vibration can make a building nonfunctional for certain tenants' needs. To offset operational risk, it is necessary to invest in enhanced structural vibration attenuation throughout the building.

Due to the potentially hazardous chemicals that life science tenants use, superior HVAC systems are required to prevent the recirculation of corrosive and toxic substances or the introduction of these substances into a fresh air room⁹. An occupied laboratory typically operates at rates of greater than eight room air changes per hour. Caution is needed when assets are fit with HVAC systems that utilize recirculated air in which the asset may require a complete retrofit of the HVAC system to meet minimum standards.

The second part of the design equation is the balance of lab and office space. Each tenant has different needs and those needs can be more complex as the company evolves. Therefore, lab space must be flexible and modular. Balance allows the tenant to use the space more efficiently and therefore the likelihood increases that the tenant will make a long-term commitment to an asset. A major pharmaceutical tenant headquartered out of London¹⁰ substantiated the search for agility: "We want to design spaces where people can share pieces of instrumentation, and the flow between different types of uses is integrated. How can we ensure space is flexible and adaptive is on our minds right now."

There is an increasing demand to add on-site manufacturing to facilities as new methods to develop targeted cellular and gene therapies enable different modalities of manufacturing of drugs. While most tenants do not have this requirement, companies with highly bespoke therapies, such as those focused on gene therapy, often require near or on-site manufacturing. The rent premium of situating this capability in a prime location can be justified by the reduction in time to deliver the therapy and a significant decrease in transportation costs.

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⁹ American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), "Designing, Operating Safe HVAC Systems for Hazardous Spaces," August 2021.

¹⁰ Hines-led interview with London-based occupier at a major pharmaceutical company; conducted in Q2 2021.

Case Study: Levit Green, Houston, Texas

The Hines project team at Levit Green, the five-story, 270,000-square-foot Phase I lab building in Houston, Texas, matches a life science tenant's constantly changing needs with capital that backed the firm's credit risk. The Hines team decided to build Class AA quality labs that are highly flexible and with key features required by top life science tenants, in a market with access to top talent and world-class research institutions. However, where possible, the team focuses on minimizing capital expenditures used to tailoring space in a nontraditional format for tenants. In doing so, should the occupier need or elect to vacate the space, the difficulty of releasing the space should be considerably lower as there is less tailored build-out.

The team has taken careful consideration during the design phase to incorporate the unique needs required by top life science tenants. Key building features will include redundant emergency power, enhanced structural vibration attenuation and augmented mechanical systems. 33-foot structural bay depths, allowing for an ideal 11' lab module, and floorplates more than 55,000 square feet will also enable research and office teams to create efficient configurations that enable teamwork and collaboration. While the space is designed at an optimal mix of 60/40 – 60 percent allocated space for lab, 40 percent for office per floor– redundancy is built in to enable up to 100 percent use of space as lab space if needed on each floor. Levit Green will methodically track and report its embodied carbon during the development process.

"The Phase I project at Levit Green has been thoughtfully designed from the inside out to include features that are required of a top-tier research environment. We are excited to deliver the highest quality of building that will enable industry leaders to better conduct their critical research," said John Mooz, Senior Managing Director at Hines.



Case study is for illustrative purposes only. It should not be assumed that future projects will be comparable in quality to the project described herein.



Levit Green – Houston

Investment horizon: the long game for life sciences

The life science office/lab property sector has an enviable track record of demand and rent growth compared to the broader office market (see Figure 2 in the following analysis). If this trend continues, both acquisition and development strategies have the potential for success. Given the prospects of continued demand growth, we believe it may be an opportune time to take the development premium for market participants who can execute on that strategy. Our scenario analysis suggests that a select group of 20 U.S. metros alone could see demand growth for Class A life science office/lab space that comprises about 45 to 65 million square feet. In addition, the Class A life science office/lab space represents a 33 to 50 percent expansion from the current all-grade inventory in those metros. This can be seen within the charts on the following pages.

The pandemic only underlined the long-term demand for continuing innovation in medical research and the production of cutting-edge pharmaceuticals. The relationship between funding and demand for life science office/lab property is clear. Venture capital funding to the biotech/pharmaceutical sector started to accelerate five years ago (see Figure 3 in the following analysis). We foresee a compelling opportunity for both acquisitions and development for investors in the U.S. life science sector over the coming decade as demand is expected to continue its robust trajectory.

“ We foresee a compelling opportunity for both acquisitions and development for investors in the U.S. life science sector over the coming decade as demand continues its robust trajectory. ”

Sizing Up the U.S. Market

The term “life science,” when used to define a category of real estate property, can generally be broken down into three broad categories. The first life science category related to real estate is industrial assets that specialize in pharmaceuticals or medical device production.

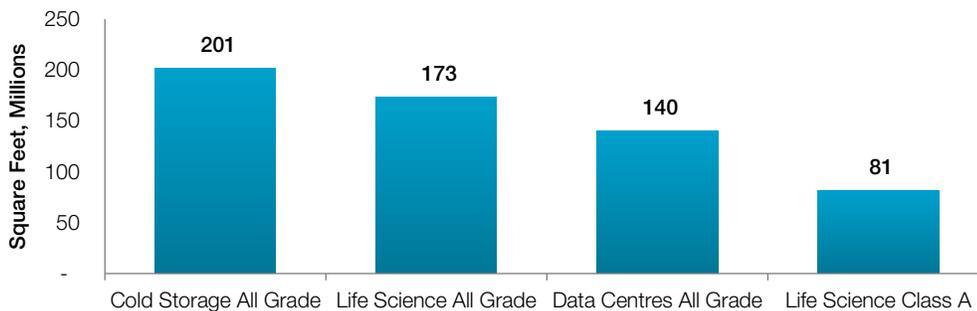
The second category is flexible, or “Flex” space, typically one to two stories, no-frills build, that blends both office and production or lab space.

The third arguably falls within the office category but may accommodate an approximate 50/50 blend of much higher-quality office space, relative to Flex, and sophisticated lab space. This category is the focus of this section and presents the opportunity to either acquire or develop high-quality life science office/lab space in major metros in the United States and ultimately outside the U.S. Even when we hone our focus to this one segment of the overall life science market, the market opportunity in terms of size is still significant and as we will see later in this section, it is particularly compelling when considering future demand growth.

Per **Figure 1**, the life science office/lab market (from here forward, we will equate the term, “life science market” with our definition provided above) is similar in size to other alternative sectors gaining attention from investors. Class A office/lab space is further segmented to show the life science market based on quality. Class A office/lab space is the highest-quality property of this type and essentially represents the “trophy” category for life science office/lab investors. The market is significant, making up about 45 percent of the overall 173 million square feet of office/lab space market tracked by CoStar. This statistic is noteworthy given that the Class A office segment makes up just 32 percent of the broader U.S. Office market. The delta here is likely indicative of the fact that life science office/lab space tenants have a comparatively high specification in terms of quality – and can afford it.

Figure 1 Life Science Offers Similar Scale to Other Alternatives

Market Size by Property Type



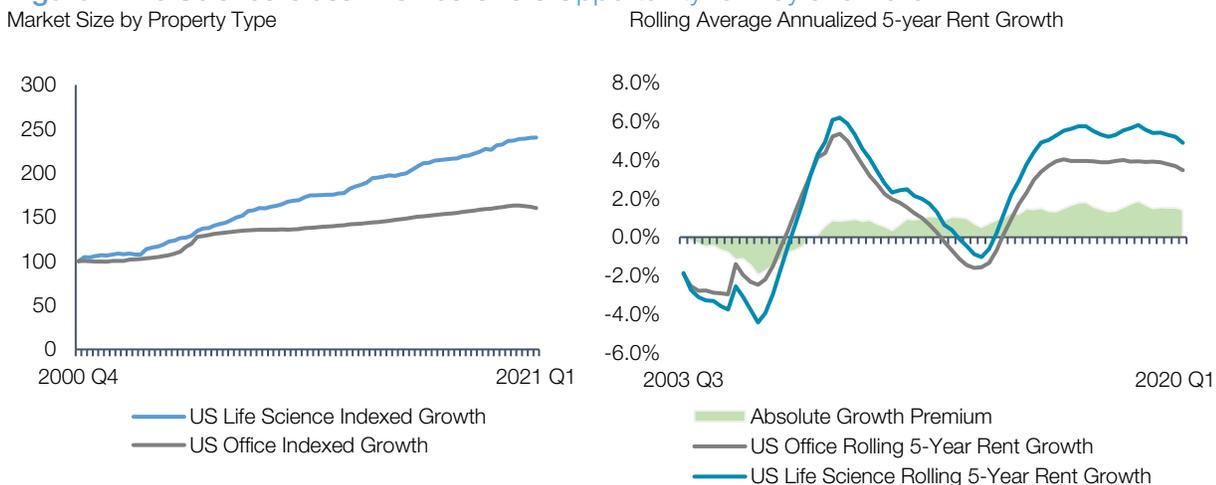
Sources: CoStar, Hines Research. As of 2021Q1.

Buy or Build?

In addition to pricing, another factor to consider in the decision to acquire versus build is whether a market or sector has outperformed over time in terms of rent growth or demand growth. A market with relatively low supply levels should outperform on rent growth versus a peer set; conversely, a market or sector in growth mode may experience elevated supply levels that, while ultimately getting filled, slow rent growth. The historical performance of the Class-A life science market has the markers of a sector in which investors can confidently buy or build; however, (1) with prices rising, (2) with the definition of state-of-the-art office/lab space continuing to evolve (previous section), and (3) with demand forecasts to be notably healthy over the foreseeable future, we believe the opportunity leans increasingly towards development.

In **Figure 2**, a comparison of demand growth – or indexed growth in occupied space – and rolling average annualized 5-year rent growth for the Class A life science and traditional office markets identified clear outperformance over time in both categories. Life science Class A demand has outgrown that of the broader office market by a factor of 1.5x over the period shown. Rent growth has outpaced office consistently since 2008 and the level of outperformance has taken a step up since about 2016.

Figure 2 Life Science Class-A Office Offers Opportunity for Buy and Build



Sources: CoStar, Hines Research. As of 2021Q1. The U.S. market is the aggregate of data from the 54 CoStar Research Markets.

If this relative performance continues, the conclusion is that both acquisition and development strategies have the potential for success, the former driven by differentiated cash flow performance and the latter driven by outsized demand growth.

As previously noted, we think the life science sector offers a particularly compelling development story for investors. A relatively lower-risk development premium underpinned by strong demand and strong rent growth should ultimately reduce the risk of missing targets for average rent levels and project value at completion. This is especially important as a counter to the possibility – always a necessary consideration – that capitalization rates move against the proforma (by rising) over the period of planning, construction and lease-up.

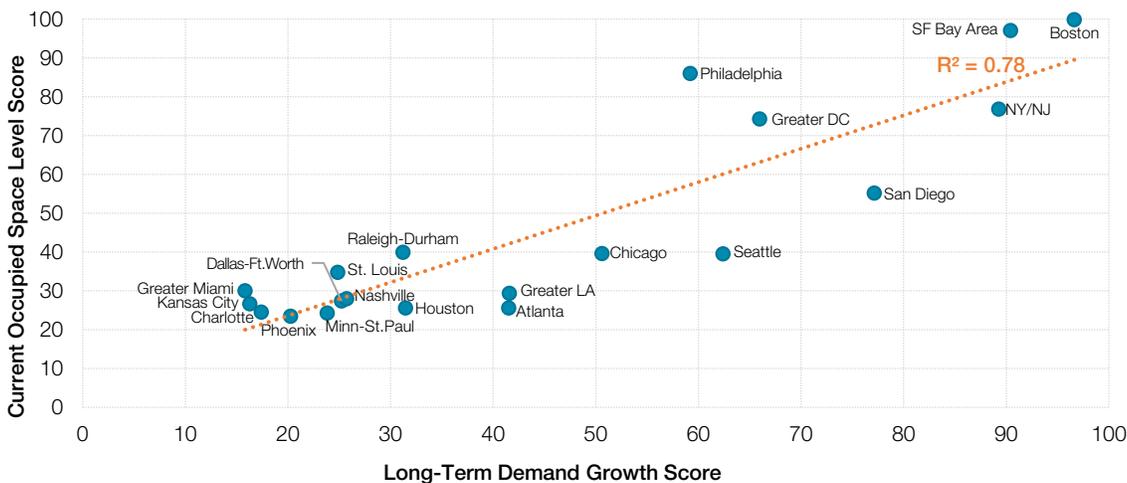
Life Sciences in Launch Mode

Will life science office/lab space demand continue to signal “Build”? Trends in the flow of government and venture capital funding to the life science sector, whether funding new research for start-ups or established firms, give us a positive signal that the answer is “yes.”

There is a clear, correlative relationship between biotech/pharmaceutical funding levels and total occupied space and overall inventory (stock in terms of total square feet) for Class A life science office/lab space, as depicted in **Figure 3**. The top 20 market sample set was identified by ranking U.S. metros by the total inventory of Class A life science office/lab space (see “In search of U.S. life science ‘frontier’ markets” on the following page).¹¹ On the funding side, we identified three major sources of research funding that include the U.S. National Institute of Health (NIH), the U.S. National Science Foundation (NSF) and Venture Capital (VC) within the U.S. We found that the change in total dollars over the last 10 or 20 years for a composite measure of funding from these three sources has shown a high correlation with the current relative size of those top markets in terms of Class A occupied life science space. While the model shown in **Figure 3** put equal weight on those three sources, flows from the NIH and VC investors were clearly the more critical in absolute terms. In fact, the NIH and VC categories made up about 95 percent of total funding to these top 20 U.S. markets over the full 2020 calendar year.

Figure 3 Life Science Funding is Highly Correlated to Relative Amount of Class A Office/Lab Inventory

Market Size by Property Type



Sources: CoStar, Crunchbase, NIH, NSF, Hines Research. As of 2021Q1.

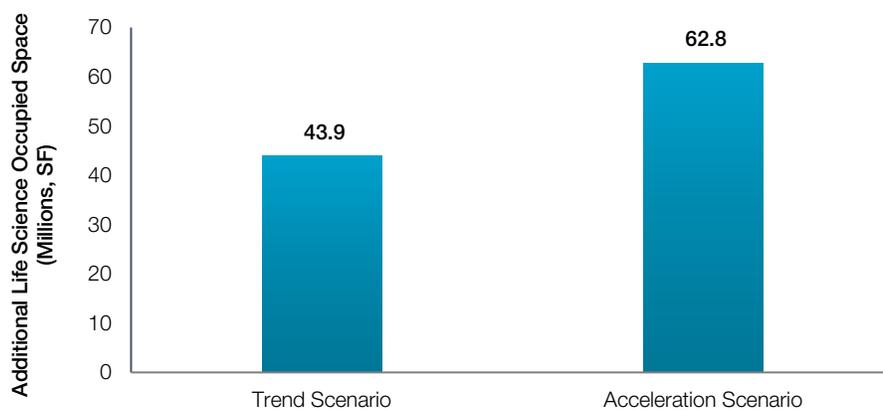
¹¹ “Frontier Markets” refer to less established markets compared to emerging markets, but, of interest due to their promising growth potential.

And this turns out to also have exceedingly positive implications for the future of life science property demand growth. The last five years have seen an exponential acceleration in funding to the life science sector with an average annual rate of 8.4 percent per year for the 20 markets covered in this analysis versus a 4.6 percent average over the last 20 years. Venture Capital funding has been the strongest contributor at 15.6 percent versus 4.2 percent for the respective periods.¹²

Establishing the relationship between the size of market demand and funding growth (or level) means we can forecast demand moving forward. To do this, we created two scenarios for funding. The more conservative scenario assumes that the three funding sources grow over the next 10 years at their historical trend growth rates.

The second is an acceleration scenario in which the first three years see growth at rates equal to the accelerated pace of the last five years, but the final seven years settle back down to trend growth rates. **Figure 4** shows the results for the 20 metro markets we analyzed. The results suggest a continued boom in demand growth for higher-quality life science office/lab space, a support for both positive net absorption or new development. The trend scenario alone would have the size of the total all-grade inventory in these top markets grow by one-third the acceleration scenario by half. The structure of the analysis specifically predicts demand for Class A office/lab space and the figures jump to about 60 percent and 90 percent when calculating the growth of the Class A segment.

Figure 4 As Funding Increases, So Does the Need for Class-A Space
10-Year Implied New Demand



Sources: CoStar, Crunchbase, NIH, NSF, Hines Research. As of 2021Q1. The Trend Scenario assumes that the three sources of funding grow over the next 10 years at their historical trend growth rates. The Acceleration Scenario has the first three years growth at rates equal to the accelerated pace of the last five years, but the final seven years revert to trend growth rates. There is no guarantee that either of these scenarios will come to fruition.

In search of U.S. life science “frontier” markets.

Given the tendency of life science tenants to focus on a handful of metro markets, when we selected our metro list for this analysis, we took the top 20 markets ranked on the size of their class A office/lab space inventory. However, there may be markets that are up and coming, but as of yet lack that kind of space; thus, while they admittedly may never be a Boston or San Francisco (but who knows!), they could be a source for interesting projects on an opportunistic basis. A ranking of U.S. metros by their trailing 5-year biotech/pharmaceutical VC funding totals might be best for identifying markets that fit that profile. And that ranking identified four markets that were not in our top 20, but rank highly in terms of recent funding:

Rank Five Years Funding

Totals	Metro
10	Boulder
14	Austin
16	Salt Lake City
20	Pittsburgh

Sources: Crunchbase, Hines Research. As of 2021Q1.

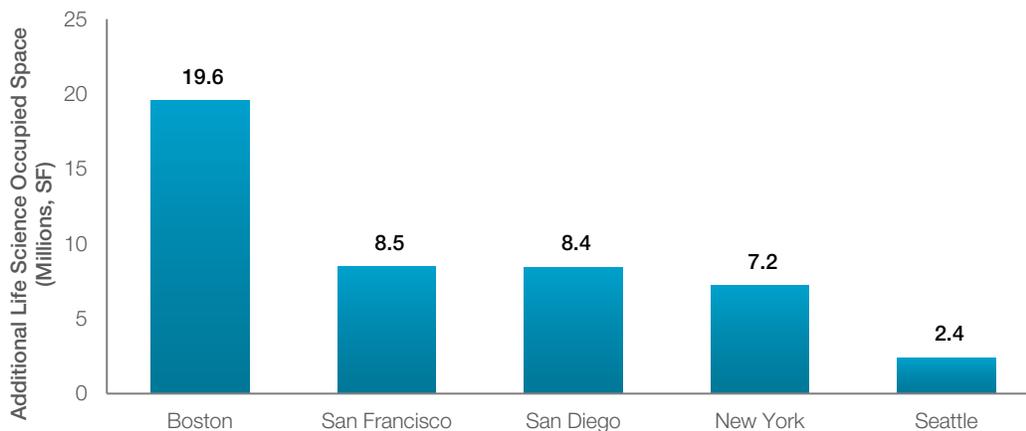
¹² NIH, NSF, Crunchbase, As of 2021Q1.

Defining Prodigious Opportunities through Funding

The U.S. life science property market is concentrated in a handful of dominant centers. In fact, 65 percent of current life science office/lab spaces that we identified sit in the top five markets (out of the 20 we analyzed). These markets are Boston, San Francisco, Philadelphia, New York and Washington, D.C./Maryland. We also found that demand is likely to be similarly concentrated with 73 percent coming to Boston, San Francisco, San Diego, New York and Seattle.

Figure 5 Forecast Demand is Highly Concentrated with 73% in These 5 Major Life Science Markets

Top 5: Implied 10-Year Demand Growth



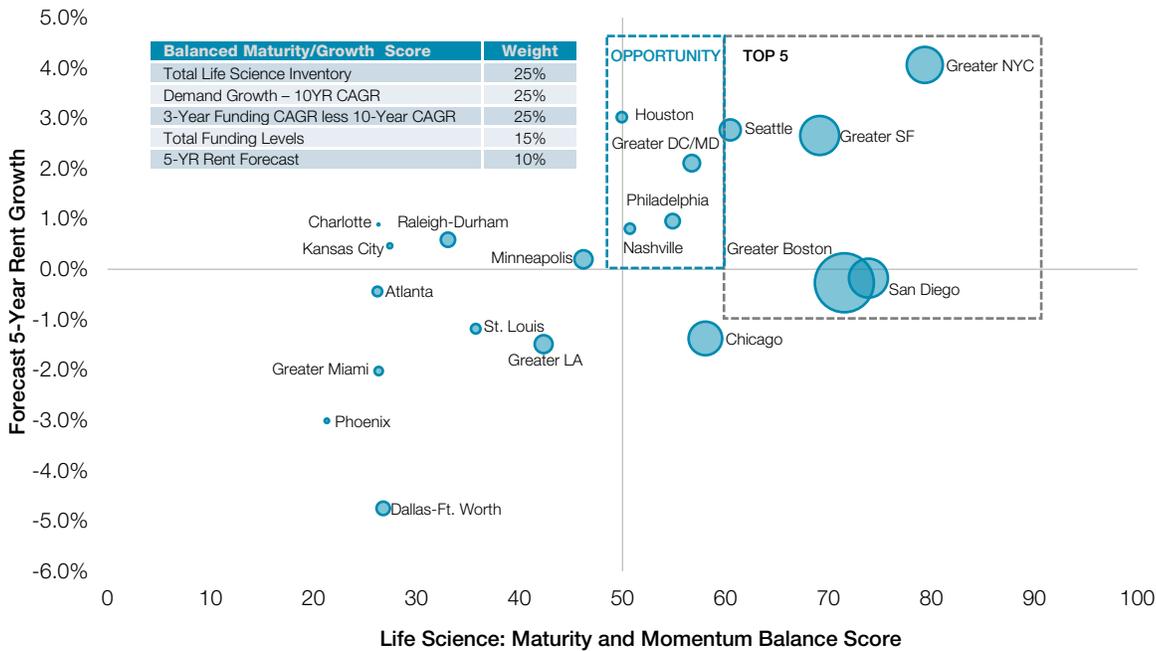
Sources: CoStar, Crunchbase, NIH, NSF, Hines Research. As of 2021Q1. These results are from the Acceleration Scenario, which has the first three years growth at rates equal to the accelerated pace of the last five years, but the final seven years revert to trend growth rates.

While acknowledging that the life science sector has seen, and continues to see, life science tenants congregate in a handful of already well-established markets, can we identify up-and-comers?

First, we created price and rent forecasts for the sample of markets for this analysis. This was done using our established forecasting framework. Second, we created a score that incorporates both maturity and momentum, thus trying to find markets that offer that dominant maturity. This dominant maturity is notable in Boston and San Francisco. We also located markets that either offer enough momentum (growth potential) to offset their lack of current size or a nice balance of competitive size and momentum. These latter markets should represent an attractive group of high potential markets without going too “frontier.” We then compared that score to rent forecasts to create the quadrant chart depicted in **Figure 6**. Not surprisingly, our top five markets in terms of forecast demand growth found their way into the top right quadrant with a strong score and strong rent forecast. However, we also found a group of less dominant markets slipped in, including Washington, D.C./Maryland, Philadelphia, Houston and Nashville. (Note: Please, see additional thoughts within the “In search of U.S. life science “frontier” markets” box on the previous page.)

Figure 6 The U.S. Top 5 Markets Offer a Blend of Maturity and Growth

Life Science Filter Score and Rent Forecast

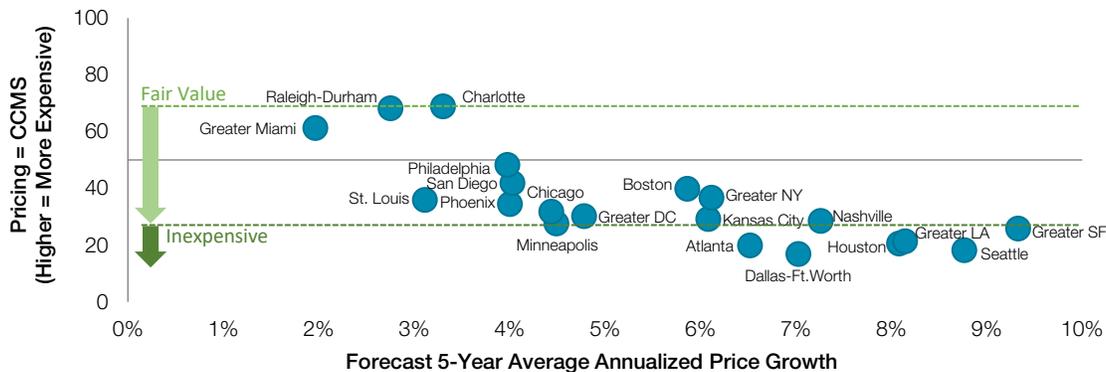


Sources: CoStar, NIH, NSF, Crunchbase, Hines Research. As of 2021Q1. The scores shown are based on weighted scores for the factors shown. Rent forecasts are per Hines Research. The size of the blue circles represents the relative score assigned based on the Hines Research model. The size of the circle correlates with the score size. A larger circle represents a more mature market that demonstrates more growth.

We specifically used rent forecasts in **Figure 6** to highlight markets with fundamental strength. However, as noted earlier in the paper, pricing (and price forecasts) must also be considered. Inexpensive markets are ripe for either acquisitions or development, both build-to-core and merchant build. Hines Research’s proprietary view on market pricing is a key input into our price forecast framework. This tells us all 20 markets we analyzed appear fair value to inexpensive (<70 on the CCMS scale), and all also offer positive price forecasts (**Figure 7**).

Figure 7 All Major U.S. Markets Are Forecast to See Prices Rise

Pricing vs Price Growth Forecast

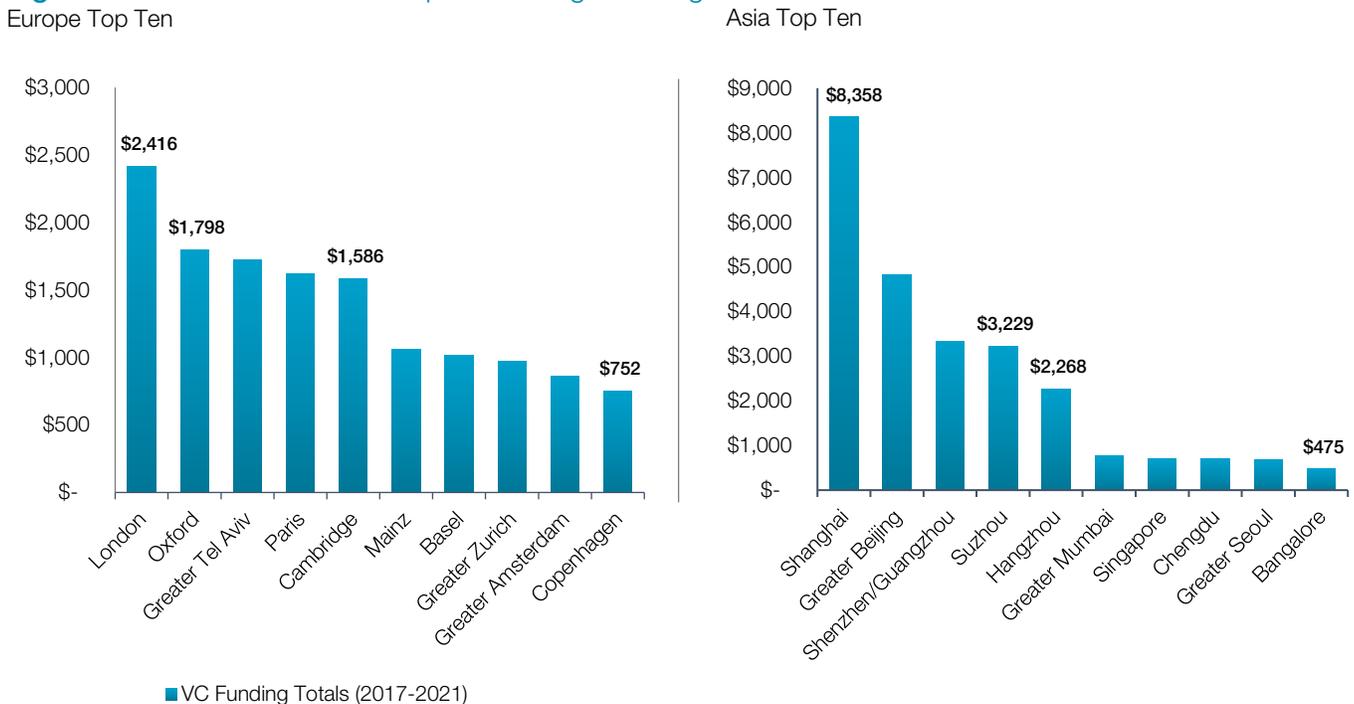


Sources: CoStar, Hines Research. As of 2021Q1. The Composite Capital Market Score (“CCMS”) is an aggregate score (0-100) derived from the following metrics: Price to Trend, Cap Rate Spreads, Growth-Adjusted Spreads, Trailing Price Growth and Trailing Total returns. The CCMS is calculated as a percentile relative to each market’s own history. Higher scores indicate that the market is expensive relative to its history. The blue circles represent the 20 markets with fundamental strengths that Hines Proprietary Research analyzed. The chart is based on estimated future pricing growth and assumes that Hines Research forecasts come to fruition.

Initial Thoughts on the Global Opportunity

As we noted at the start of this paper, there will be an opportunity to acquire/develop in markets outside the U.S. While more work will be done on this front, we have developed some initial views on the relative opportunity for major life science markets in Europe and Asia. We have shown that funding had a strong correlation to both size of the market and, tangentially, demand. VC funding appears readily available for major markets across the globe, and we also found it to be the main driver of recent acceleration in biotech/pharmaceutical funding, at least in the U.S. As data may be more volatile and/or less comprehensive in markets outside the U.S., we changed our approach to account for that. A first attempt at identifying key markets started with ranking markets by total VC funding over the last five calendar years, although we have used only the year-to-date data for 2021. In **Figure 8**, we show the top 10 markets in both Europe and Asia on that measure.

Figure 8 Life Science Venture Capital Funding: Ranking of Metros on a Global Basis



Sources: Crunchbase, Hines Research. Showing totals for the last 5 years. As of 2021Q1.

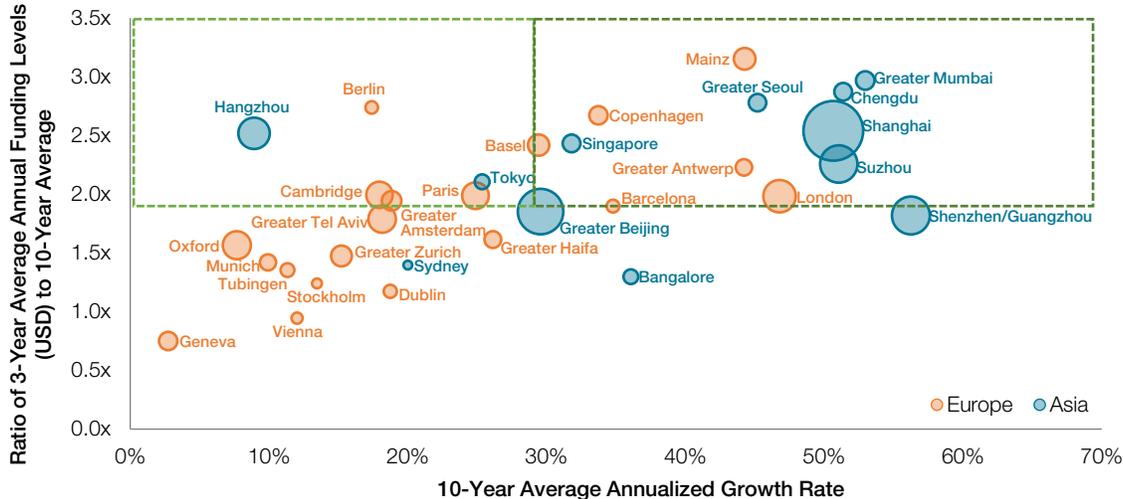
Three key takeaways:

- First, both Europe and Asia appear dominated by a single center in each, with the UK's Golden Triangle (Oxford/ Cambridge/ London) and the similar triangle of Shanghai/ Suzhou/ Hangzhou leading on this measure to a great extent.
- Asia generally appears to attract more capital than Europe with \$25 billion total for the top 10 shown in Asia but only \$14 billion for Europe's top 10.
- Asia is more concentrated with the difference between Shanghai, at first, and Bangalore, at 10th, being almost \$8 billion; however, in Europe, the industry seems to be more greatly dispersed, with the difference between London and Copenhagen only about \$1.7 billion.

A second analysis (**Figure 9**) provides insights into which markets have offered the highest historic growth rates for life science VC funding combined with the strongest momentum. The findings have implications for which markets may have a more positive future, on a relative basis, for life science office/lab space demand. Given the volatility of the data (as noted above), we used a slightly different momentum measure that compared the average annual funding levels (in USD) over the last three years to the trailing 10-year annual average. It is shown as a ratio of the three-year average to the 10-year average. A factor of 2x (or doubling) seemed to be a fair dividing line between those with average or below-average momentum and those with above-average momentum.

Figure 9 Finding Momentum for Life Science Markets on a Global Basis

Momentum Analysis: Life Science VC Funding



Sources: Crunchbase, Hines Research. As of 2021Q1. Bubbles are sized on 5-year totals for VC funding.

Key takeaways are similar to those gleaned from the first analysis. While both regions show large dispersion between markets on the long-term growth measure, Asia has tended to skew to the right (or higher historical growth). At the same time, it is relatively clear that Asia has had the higher average momentum, though certain markets in Europe also look attractive on this measure (Mainz, Basel, Copenhagen, Berlin, Greater Antwerp in Belgium, and London and Cambridge are right at 2x).

New Life for Life Science

The life science sector appears to be set for growth. The sector's historic track record and current pricing tell us that either acquisitions or development strategies should be able to succeed given the current setup, but given the compelling demand growth story, development likely offers what could be considered a relatively low-risk development premium.

Government and venture capital funding seem to have an important role in supporting demand for new, higher-quality life science office/lab space. That funding has accelerated meaningfully in recent years, and even conservative scenario analysis suggests that a select group of 20 U.S. metros alone could see demand growth for Class A life science office/lab space – here measured as the change in occupied space – of between 33-50 percent over the next 10 years. This would equate to a total of almost 45-65 million square feet of new demand over a current base of 71 million Class A inventory and 131 million of all-quality inventory. While the industry appears to be very concentrated, with both funding and demand focused on a select handful of established markets, in both the U.S. and ex-U.S. markets, there are up-and-comers that could provide attractive opportunities, particularly for development as new space is required by new or expanding tenants.



Conclusion:

Careful considerations

While the outlook for life science appears overwhelmingly positive, several considerations should be kept in mind for investors exploring the sector:

- Increasing investor interest and pricing may further reduce risk-adjusted returns
- Tenants require higher complexity in technical systems compared to office projects
- Regional clusters can increase the difficulty to diversify geographically
- Possible exposure to start-ups and increased credit risk, depending on the tenant mix
- Venture capital and government funding help tell the story of clusters from a buy or build perspective
- The life science sector serves as a major solution-partner on many of the challenges confronting humanity for ESG. As the industry itself is a major consumer of energy, it will require innovative ESG approaches from development partners to ensure standards are exceeded

To enhance investment success, partner with a vertically integrated owner, operator and developer that can add value across the life science lifecycle.

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Mr. Bott is responsible for leading the project management, analysis, and execution of complex, multi-stakeholder projects that align with the firm's long-term strategic objectives. Prior to joining the Strategic Projects Office, Mr. Bott served as an Associate, Transformation Office, for Hines, where he supported the rollout of the investment management strategic transformation.



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As part of the Hines Research team, Mr. Hudgins assists in constructing the Hines macroeconomic view and outlook for commercial real estate market fundamentals and pricing. He contributes to the development of investment strategies for the firm's investment programs, including guidance on portfolio allocation for Hines funds. As part of his day-to-day responsibilities, he works closely with the local and fund management teams, clients and partners, while also supporting our regional country heads in identifying market/submarket opportunities and risks.



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¹³ Includes both the global Hines organization as well as RIA AUM as of June 30, 2021.

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