Appendix A: Methodology

The goal of our national scan was to curate a purposive sample of six sites where each case represents a differing pathway toward office-to-residential (O2R) conversion. For this phase of the research process, we refer to the cases as "sites" rather than "cities," as several of the variables we considered in the selection process occur either at the hyperlocal level (for example, a neighborhood such as a downtown that is smaller than a city) or the regional level (such as job market growth). Most importantly, the final six selections are all local jurisdictions with authority over policies relevant to land use change, but there was no specific restriction that these be municipalities.

The team undertook the following research sub-tasks during our national scan:

Scan 4,766 submarkets

Our methodology for curating the purposive sample began with a multivariate quantitative analysis similar to [other bivariate triages](#) of office and housing markets in which multiple variables define a possibility space for O2R conversion and illustrative cases stand out at the edges of the space.

The CoStar database is the most widely adopted data source in commercial real estate research due to the [market-leading](#) size of their database of lease and sales transactions. The CoStar group divides U.S. metropolitan areas into "submarkets" that represent a hyperlocal lens for aggregating and analyzing how commercial real estate inventory, demand, and activity vary geographically. There are 4,766 overlapping submarkets defined in the CoStar database.

We analyzed all 4,766 submarkets for market conditions that are conducive to the development of O2R conversion policies. First, an office submarket must be of sufficient size to contain multiple office buildings that could potentially yield enough residential units through conversion and thus merit a policy approach. For context, the average CoStar office submarket is 7.7 million square feet, but the median submarket is only 2.7 million square feet. This distribution indicates that most CoStar office submarkets are very small and a few are extremely large. Given that a single large office building can contain 1 million square feet, we applied a threshold of 5 million square feet of inventory within the submarket to strike a balance between identifying markets of a reasonable size without creating a sample that excludes places outside of the largest metropolitan areas. This reduced the sample pool to 1,660 submarkets. It is worth noting that this also has the effect of excluding very small cities. This is not because O2R conversion is not relevant to such places, but rather that both the market and policy dynamics of such places are systematically different and require a different research design.

O2R conversion is only relevant in markets where there is some evidence of weak or shifting demand for office space. The best leading indicator of office demand is the availability rate—a measure that captures both vacant spaces listed for direct lease and currently leased space offered for sublease (an indication that the tenant is not currently using the space and does not plan to in the future). The CoStar submarket average availability rate is 9%. We considered every submarket with an above-average availability rate—a count of 1,165 submarkets.

For conversions to make economic sense at scale, older buildings must compose a larger share of the office submarket's inventory. This is because in markets where very new buildings are a large share of inventory, there is a strong signal of demand for office space. We calculated the share of each office submarket's inventory that was delivered in the last five years (2018 to 2023). The average office submarket is only 3.8% new inventory, but the submarket with the highest share of new inventory is at 57.9%. In other words, some office submarkets are very "young," and conversions are not relevant in such contexts. We looked at all office submarkets where the share of new buildings was below the median of 1.5%, which was 352 submarkets.

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We then aggregated these 352 CoStar submarkets to the county level, as the next level up of Census Bureau geography from a CoStar submarket, so that we could analyze additional economic and demographic data. These 352 CoStar submarkets were in 106 unique counties. We then repeatedly ranked these counties and tallied all rankings across seven variables to find counties that represent regional resident and workforce population trends, geographies, and motivations for conversion desired in the purposive sample. The seven variables and data sources are summarized in Table 1.

**Table 1. Variables and data sources for national scan**

County-level economic and demographic criteria	Data source
Count of eligible submarkets	CoStar
Large county by population	American Community Survey 5-year Estimates for 2012 and 2022, and 2020 Census Bureau County Boundaries
Small county by population	American Community Survey 5-year Estimates for 2012 and 2022, and 2020 Census Bureau County Boundaries
Low change in jobs, 2012 to 2022	Census Bureau Quarterly Workforce Indicators for 2012 and 2022, and 2020 Census Bureau County Boundaries
Difference between population growth and job growth, 2012 to 2022	American Community Survey 5-year Estimates for 2012 and 2022, and Census Bureau Quarterly Workforce Indicators for 2012 and 2022
High rent-to-income ratio	American Community Survey 5-year Estimates for 2012 and 2022
Low rent-to-income ratio	American Community Survey 5-year Estimates for 2012 and 2022

Interview 20 office submarkets

We selected a short list of 20 counties from those that ranked highly in this cumulative process, ensuring geographic diversity at the national level by selecting no more than two short-list candidates from any one state. The short list is illustrated in Figure 2.

We then conducted at least one interview with a local expert in each short-listed county to collect real-time qualitative information on existing conversion policies and activity, local taxation and land use approaches, and the range of office building typologies present. To conduct these initial interviews, we used the abbreviated interview guide in Table 2. Our questions were aimed at collecting enough information to make an informed decision on final site selection, occurring in our third sub-task.

Figure 2. Map of 20 sites
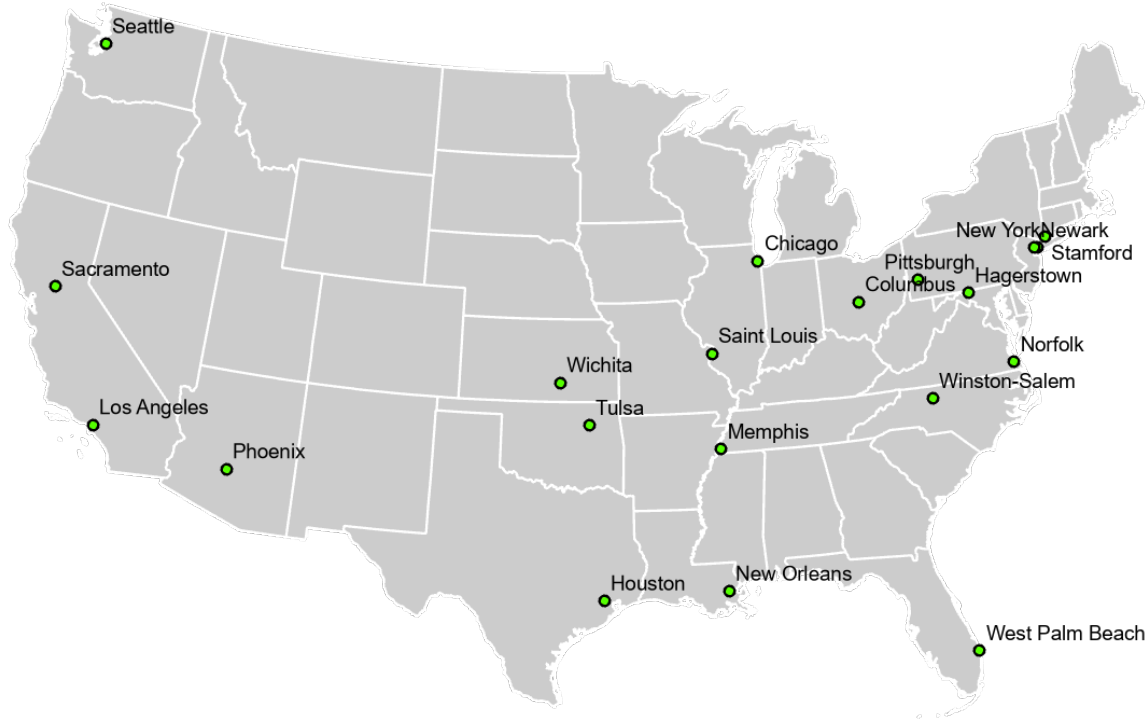
Table 2. Interview questions

#	Question
1	Can you give me a sense of what the current state of office-to-residential conversion in your jurisdiction is? Do any examples of specific recent projects come to mind? Can you give me any examples of projects that have reached the delivery phase?
2	Do you think your market has strong potential for office-to-residential conversion? Why or why not?
3	What is the geographic distribution of office-to-residential conversion in your area? What's your sense of where the most market activity is? Why do you think that is?
4	Is there anything specific or special that you think your area is really getting right about office-to-residential conversion? Are there specific policy or incentive schemes that are working well?
5	Who is working on office-to-residential conversion in your market? Developers? Public administrators? Legislators?
6	Who else should I talk to in order to understand office-to-residential conversion in your area?

Select six sites

Based on the qualitative and quantitative data gathered across the initial cohort of approximately 20 office markets, we selected a purposive sample set of six representative case studies. Table 3 lists the six sites along with descriptive characteristics from the site selection criteria.

In our final selection of six cities, we optimized for diversity within the bounds of replicability by identifying five measurable parameters that capture dimensions of the six potential motivations for pursuing conversions we previously identified, as well as additional factors that are important to produce findings of national relevance across a range of office markets:

(1)   Growth trajectory: Regional resident and workforce population trends
(2)   Geography: Coverage of U.S. regions and a range of market sizes
(3)   Activity: Existing conversion policies and future potential activity
(4)   Fiscal and legal structure: Taxation and land use approaches
(5)   Urbanity: Range of office building typologies

Table 3. Case study sites

Site	Characteristics		Activity	Fiscal and legal structure	Urbanity
Los Angeles	Growth	Growing	A 1999 adaptive reuse ordinance is a frequently cited model but applied only to downtown; expanding the Adaptive Reuse Program is one of six key strategies of the proposed 2024 citywide Housing Incentive Program.	Statewide cap on residential property tax increases; recent state policy changes have increased the set housing production numbers for most communities, set specific affordability guidelines, and greatly strengthened tools for enforcement.	Urban: Extremely broad mix of building sizes, ages, and typologies.
	Region	West			
	Market size	Large			
Stamford, Conn.	Growth	Stable	Multiple projects proposed; several lawsuits pending.	State legislation streamlining adaptive reuse permitting has recently passed in the state senate.	Suburban: Smaller buildings.
	Region	Northeast			
	Market size	Medium			
Pittsburgh	Growth	Shrinking	A lot of potential inventory could be converted, and multiple projects already underway.	Extremely high office vacancy rate downtown (already almost 30% and could double); political demand for affordability but extremely weak market conditions and subsidies available.	Urban: Mostly historic buildings.
	Region	Northeast			
	Market size	Medium			

Winston-Salem, N.C.	Growth	Growing	Several projects using historic tax credits or senior housing; local practitioners unsure how to complete future projects that are not eligible for existing tax credits.	Smaller city with limited capacity to subsidize either affordable housing or economic development.	Urban: Mix of building ages.
	Region	South			
	Market size	Medium			
St. Louis, Mo.	Growth	Shrinking	Existing owners of two very large buildings downtown do not have capacity or motivation to move them to productive use; city is threatening condemnation.	St. Louis Development Corporation has notable powers and capacity; SB792/HB1935 tax credit proposal did not pass in last state legislative session but will likely be introduced again next year.	Urban: Mostly historic buildings.
	Region	Midwest			
	Market size	Medium			
Houston	Growth	Growing	Mix of conversions to rental and hospitality—need to figure out affordable and for sale options.	Houston Housing Authority Public Facility Corporations model; city budget has not been balanced in several years (relying on debt and federal relief for operations).	Urban: Mostly very large buildings not of historic age or character.
	Region	Southwest			
	Market size	Large			

Case study approach

Qualitative data for the case studies came from original interviews and field observation conducted by research team members. The research design included up to 15 interviews per case to develop a 360-degree view of local O2R conversion dynamics. The research team recruited informants representing the following types: local public sector economic development and housing leaders, commercial property owners, residential developers, lenders, and community-based organization leaders.

Table 4: Total stakeholders interviewed by site

Site	Total interviewees
Houston	10
Los Angeles	15
Pittsburgh	16
Stamford	11
St. Louis	7
Winston-Salem	11
Total	70

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Table 5: Total stakeholders interviewed by industry

Industry	Total interviewees
Architecture, engineering, construction	9
Government	20
Nonprofit	12
Real estate	29
Total	70

Real estate market scan

Each case study includes a market scan to understand the health and strengths of the real estate market. These market scans quantify demand and supply trends for office and residential uses, broken down by submarkets and building typologies in each case study. We define three typologies per case study, considering different building characteristics as well as location in submarkets.

For example, on the residential side, single-family housing market trends may be distinct from multifamily rental market trends. Similar differences may exist in Class A/B/C office products in multistory or standalone buildings. We focus on the appropriate typologies in the different case studies, as relevant. In this analysis, we use industry-standard metrics such as rents, vacancy rates, absorption, operating expenses, forthcoming lease expirations/renewals, cap rates, inflation, existing stock and pipeline, and availability of affordable and other forms of supportive housing, among other relevant data.

In addition to industry-standard data sources such as the aforementioned CoStar, we leverage third-party data sources, reports, and interviews where possible.

Physical feasibility study

In 2019, Gensler created an algorithm that helps to quickly identify which individual office buildings are feasible for conversion into residential use. The algorithm works by breaking existing office assets into a series of 150 data points, which are then compared to matching data points of a "goldilocks" residential building in the same neighborhood. The algorithm can determine the feasibility "gap" between the base office building and the residential building, estimating how far the base building is from possessing the features of the residential building. These data points are then scored and weighted based on how much they impact the physical and financial viability of a conversion. Since the onset of the pandemic, Gensler has used its algorithm on over 1,500 buildings in more than 130 cities.

We use Gensler's tool to "score" up to 25 buildings in each of the case study cities, organized under the three to five typologies identified in the real estate market scan. The buildings were selected based on data availability, while ensuring representativeness across the local market. This approach allowed the research team to identify trends across the city, which may be influenced by factors such as grid size, age of major developments, and the size and type of the most popular residential units.

From the long list of up to 25 buildings scored, we extracted three representative buildings across asset classes and typologies for design and cost estimating. We selected buildings with features typical of each city so they can serve as a proxy for others nearby. For the selected buildings, Gensler created schematic architectural designs for residential use, including test floor plans, corresponding statistics (e.g., unit creation), and a description of any work required to adjust the facade for residential use.

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In a subsequent phase, Turner Construction will review and measure these conversion designs and descriptions to determine a cost estimate. Turner Construction will create their estimate based on construction costs for comparable buildings in each market; if a comparable project does not exist in a given market, Turner Construction will adjust its estimate using a benchmark from an industry-standard cost index such as RSMeans. This approach mimics the estimating process a general contractor would typically undertake to bid on a project; it therefore allows us to compare market-level data with "real" project costs on specific buildings to benchmark the financial feasibility of conversion.

Figure 3 includes an explanation of how different variables are weighted in Gensler's algorithm. Table 6 includes a summary of the intake form that Gensler designers fill out when beginning a building study, and Figure 4 displays a representative example of a city-level analysis, comparable to what we will produce for each site.

Figure 3. Weighting of conversion variables
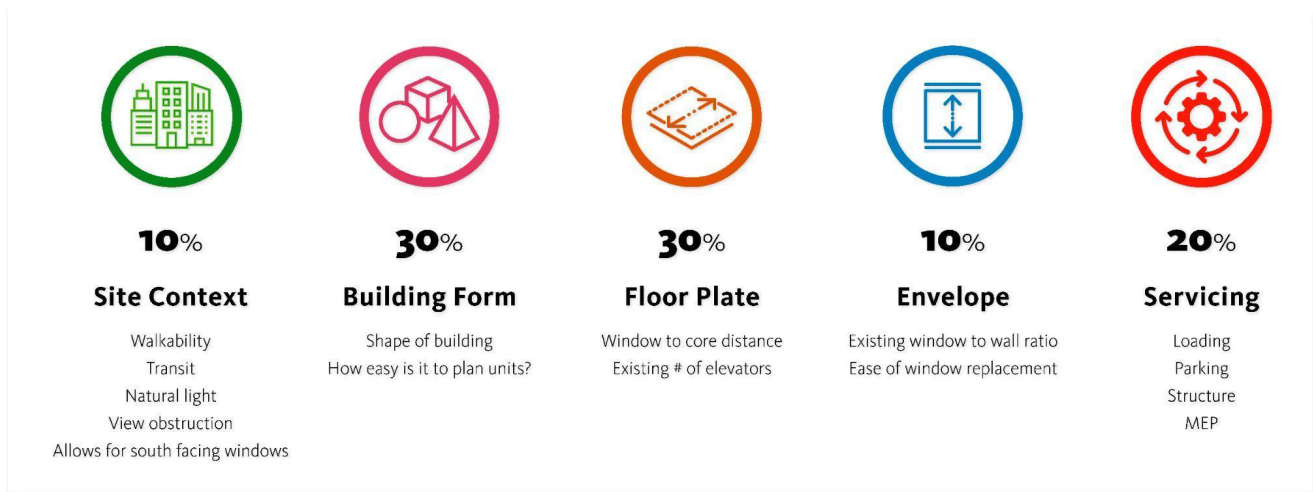
Table 6. Intake form: New building study

Input data	Typical source	Reason
Name of developer/owner	Public/broker package	Tracking
Name of broker	Public/broker package	Tracking
Project name	Public information	Tracking
Building address	Public information	Input for neighborhood analysis such as walkability and end unit value
Date of construction	Public record by city	To establish trends and typologies of which buildings are the most suitable
Last date of renovation/upgrade of systems	Broker package/public record by city	Informs cost of conversion and upgrade/the amount of existing systems and materials that can

		be reused
Zoning designation	Public record by city	Informs policy requirements
Site area	Public information	Data input for density, cost, and other calculations
Original architect	Public record by city	Tracking
Vacancy rate as office	Broker package	Informs value of the existing asset and viability calculation for conversion
Gross square feet of building	CoStar	Data input for density, unit size, unit count, carbon analysis, and other outputs
Community type	Analysis	Data input for calculations such as parking requirements, loading requirements, target unit size, target unit mix, project cost, project value, and others
Target unit size/mix	Market scan	Data input for calculation of unit count, floor plate efficiency, and others
Number of floors to be converted	Building data	Data input for multiple calculations
Average floor plate size	Building data	Data input for multiple calculations
Existing elevator count	Building data	Data input for accessibility calculation and cost analysis
Service elevator count	Building data	Data input
Existing floor-to-floor height	Building data	Data input for calculations of building value, construction cost, unit value, and others
Building form/shape	Analysis	Data input for calculations on estimated floor plate efficiency, unit mix, and others
Window placement and facades	Analysis	Data input for calculations on estimated floor plate efficiency, building value, unit value, and others
Window type	Analysis	Data input for calculations on the viability of the facade

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		reuse/replacement or overcladding, value analysis, cost analysis, and others
Core-to-window depth	Building data	Data input for determining floor plate viability, unit size, unit proportion, unit value, and others
Grid spacing	Building data	Data input for determining floor plate viability, unit size, unit proportion, unit value, and others
Column free space	Building data	Data input to determine potential use of amenity and nonresidential space
Use of post-tension concrete	Building data	Data input to determine flexibility of layouts and cost of construction
Existing parking count	Broker package	Data input for calculation of parking ratio, unit value, and comparison to market requirements
Mechanical room location	Building data	Data input to determine viability of systems replacement
Existing loading	Analysis	Data input for building operations

Figure 4. City of Calgary scorecard