



March 2018

Fostering Economic Diversity and Innovation Through Industrial Lands

The amount of industrially zoned lands in the Bay Area is a relatively small share of acreage in the overall region, but the industrial uses of these lands are highly valuable to the region's economy. Industrial uses generate middle-wage jobs which are an important contribution to job quality in the region. Patterns of employment both in the present and projected to 2040 indicate that middle-wage jobs are almost twice as concentrated on industrial lands as in the region generally. The activities and economic linkages of businesses clustered on industrial lands provide significant regional economic benefits, particularly in terms the dominant uses for warehousing and R&D.

The region must carefully steward its lands zoned for industrial usages, both because they are in demand and because industrial uses have natural limits on the extent to which they can be made more productive through increased density. There is very little vacant industrially zoned acreage in the urban core where overall demand for warehouse and manufacturing space is increasing due to the rises in new modes of production, e-commerce, and just-in-time delivery. These uses in particular require relatively low densities, needed in part to accommodate parking, loading, and other surface uses, many in connection with warehousing.

Fostering a robust, resilient, and diverse Bay Area economy requires thinking about industrial land use at a regional scale, and considerations should be balanced in terms of economic, transportation, equity, and environmental site characteristics. Maintenance and retention of industrial zoning should be top priority on parcels that meet one or more of the following key criteria:

- the lands are currently serving or could expand the service of industrial uses linked to the Bay Area's key innovation clusters;
- the lands accommodate or could accommodate industrial-land-dependent uses that provide middle-wage jobs;
- the lands are in areas—particularly those in the urban core—that are projected to have deficits of industrially zoned land by 2040.

Although current analyses suggest that conversion of industrial lands is proceeding at a slow pace, industrial zoning conflicts with other general plan and Priority Development Area designations could increase conversions in the future. Especially in the urban core, since it is much easier to remove acreage from industrial uses than it is to create new areas of industrial zoning, the Bay Area's industrial lands need to be viewed as a somewhat finite resource of particularly high value.

Industrial Land Use Patterns

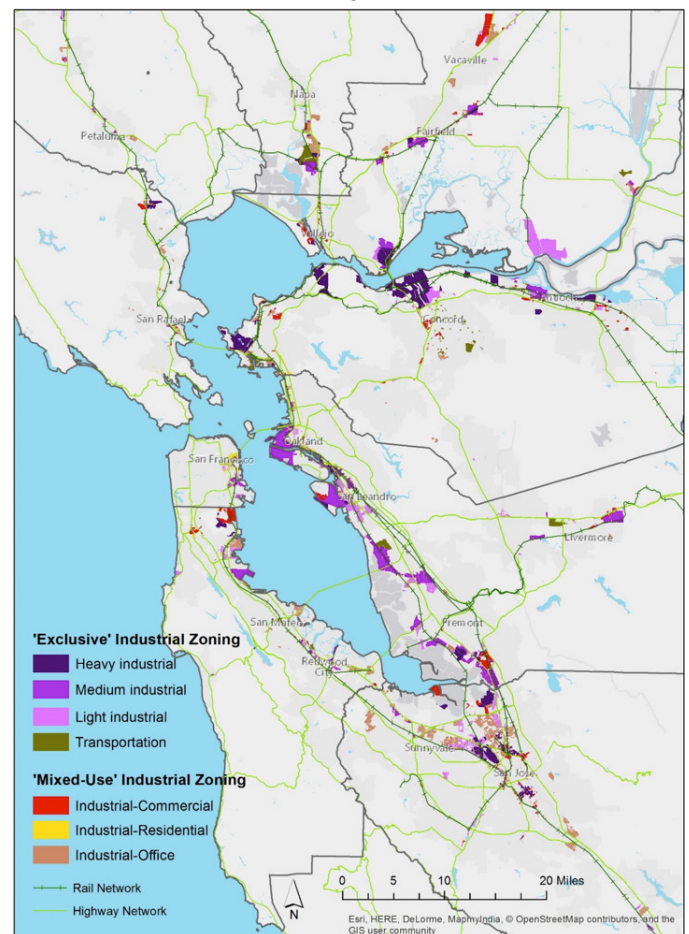
Industrial lands in the Bay Area support an array of activities that are vital to fostering a robust and resilient regional economy with a healthy diversity of industries. The 2.2% of the Bay Area’s land that is zoned for exclusive industrial use, mixed use allowing industrial activity, or transportation and utilities use houses business functions ranging from manufacturing and R&D, to warehousing and storage, to intermodal freight and logistics, to provision of supplies and services such as back-office functions or vehicle repair.

Several major recent studies have emphasized the importance of industrial lands and their many uses—including advanced manufacturing—to the regional and megaregional economic ecosystems. Among them, the Bay Area Council Economic Institute study *Reinventing Manufacturing: How the Transformation of Manufacturing is Creating New Opportunity for California* (April 2016) documents the recent technological advances in additive manufacturing and sensor-enabled automation that are revolutionizing manufacturing work in California and the Bay Area and are vital aspects of the region’s leadership as a global hub of innovation. The *Industrial Land and Jobs Study for the San Francisco Bay Area* (July 2017), which was conducted by UC Berkeley, provides a great deal of detail on industrial lands and their usage within the Bay Area¹ and lays out a framework for thinking about the highest value uses of these lands and how to resolve conflicts among competing priorities for the use of valuable land in the region.

According to assessors’ data, there are 97,824 acres of industrially zoned land in the Bay Area, as measured by a two-tiered classification system that accounts for differences in zoning codes across the nine-county region. The first tier includes four zoning categories in which the land is devoted exclusively to industrial uses, ranging from heavy industrial uses that could be incompatible with other uses due to impacts such as noise, traffic, or odor, to light industrial uses that are relatively free of noxious impacts but are still quite different from office or retail uses. The second tier includes three mixed-use categories which allow office, commercial or residential uses alongside industrial uses.

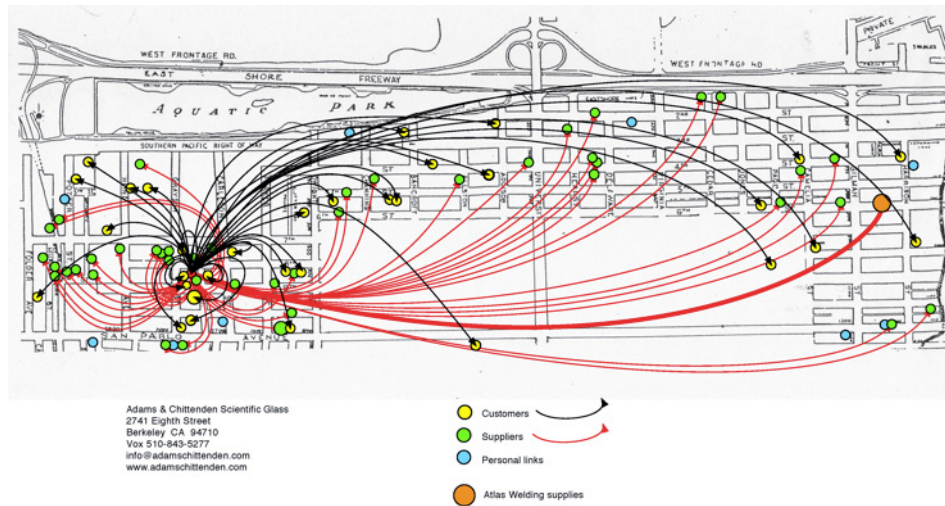
As illustrated in Figure A, the amounts and categories of industrial lands are not evenly distributed across the region as a whole. Heavy industrial land is concentrated in the East Bay, which has significantly more land zoned for exclusive industrial uses, while both the Peninsula and the South Bay have greater mixtures of industrial and office uses in general. Alameda county has the largest amount of industrial land, followed by Contra Costa, Santa Clara, and Solano counties.

FIGURE A
Industrially zoned land in the San Francisco Bay Area (nine counties and inner Bay Area)



Source: Center for Community Innovation, UC Berkeley, *Industrial Land and Jobs Study for the San Francisco Bay Area*

FIGURE B
Customers and Suppliers of Adams & Crittenden Scientific Glass, Berkeley



Source: Adams & Crittenden Scientific Glass as published by Center for Community Innovation, UC Berkeley, Industrial Land and Jobs Study for the San Francisco Bay Area

These industrial land use patterns may be viewed as indicative of the kinds of industries that have already clustered in particular areas or are being encouraged to do so by cities’ business attraction efforts. Analysis of results from a survey of businesses located on Bay Area industrial lands offers insights into the variety of businesses housed in such clusters, their economic linkages, and the regional economic benefits of concentrations of production-related businesses.

While many of these businesses export nationally and internationally, they are also key suppliers of goods and services to other companies in the local and regional economy, and their clustering creates networks of customers and suppliers that can bolster productivity, boost innovation synergy, and lower the costs and climate

impacts of goods movement. A map (Figure B) provided to the *Industrial Land and Jobs Study* by the Adams and Crittenden Scientific Glass company strikingly illustrates a web of customer/supplier relationships in one West Berkeley industrial neighborhood.

Analysis of how businesses use buildings and space on industrial lands also sheds light on the contributions these areas and their activities make to the regional economy. The dominant uses of the region’s total industrial building stock are warehousing at 51% and R&D at 30%; of the remaining stock, manufacturing uses 16%, leaving 3% for other specialized uses. At the sub-regional level, warehousing dominates everywhere except in the South Bay, where R&D is concentrated (see Table 1).

TABLE 1
Industrial Building Stock by Type (2015)

	Total Stock (sq ft)	% R&D	% Warehousing	% Manufacturing	% Other
East Bay	247,027	20%	60%	19%	1%
South Bay	180,702	53%	29%	14%	4%
North Bay	54,189	7%	76%	16%	1%
Peninsula	50,220	26%	54%	15%	5%
San Francisco	30,444	23%	64%	7%	7%
Bay Area Total	562,582	30%	51%	16%	3%

Source: CBRE data as published by Center for Community Innovation, UC Berkeley, Industrial Land and Jobs Study for the San Francisco Bay Area

The importance of industrial lands, particularly in the urban core, is highlighted by the increasing demand for warehousing space due to the rise of just-in-time delivery, e-commerce, and consumer desire for “instant” order fulfillment and delivery. Optimal warehouse location is critical for companies attempting to minimize travel time in order to satisfy customers in a cost effective manner. Industry publications such as Logistics Management and MHL Magazine have identified a general trend of companies shifting from traditional hub and spoke distribution arrangements to distribution networks utilizing smaller regionalized distribution centers closer to their customers.

Quality Jobs and Job Growth

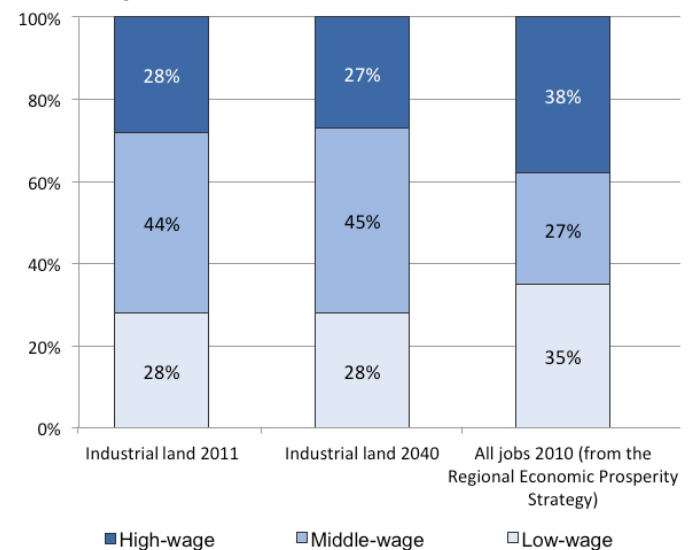
An overview of industrial-land-dependent jobs and their projected growth from 2011 to 2040, based on employment data mapped for the nine-county region by block group (the smallest geographical unit used for data tabulation by the US Census Bureau), shows how these lands support quality jobs and job growth. The estimate for 2011 Bay Area jobs in industries that tend to concentrate on industrial land is 600,824 jobs. Slightly more than a third of these jobs (205,561) are actually located on industrially zoned land, with the remainder located in adjacent block groups. Assuming a 24% expected growth rate, the regional total of industrial-land-dependent jobs is estimated to grow to 747,301 by 2040, with 254,966 of those jobs actually located on industrial parcels.

A job quality analysis of this data that focused on middle-wage jobs (considered to be “accessible jobs” that require relatively lower levels of education) produced encouraging results. In 2011, 44% of jobs on exclusive industrial lands were middle-wage jobs, while the shares for high-wage jobs and low-wage jobs were 28% each. As illustrated in Figure C, this is a favorable distribution (especially considering that only 27% of total Bay Area jobs offer middle wages), since middle-wage jobs are of key importance in fostering a Bay Area economy with social, economic, and spatial mobility that is good for everyone, as explained in the *Economic Prosperity Strategy* report, published by a SPUR-led team in 2014.² The projected distribution for 2040 is similarly favorable, with the share of middle-wage jobs

slightly increasing to 45% while the share of high-wage jobs drops one percentage point to 27%.

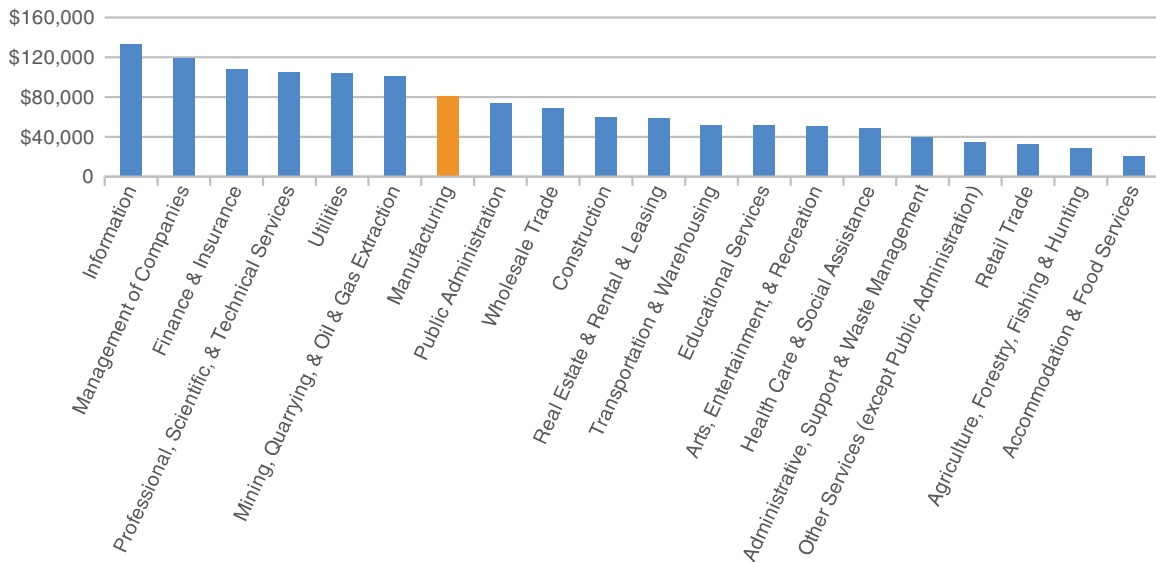
Among the industrial-land-dependent NAICS employment categories that are projected to see job growth by 2040 are several manufacturing sectors, including Machinery Manufacturing, which is expected to add over 3,000 new jobs, and five other manufacturing categories (Nonmetallic Mineral Products, Fabricated Metal Products, Transportation Equipment, Wood Products, and Beverage and Tobacco Products) that are expected to provide more than 200 new jobs each. This is also a favorable projection, since manufacturing jobs offer solid incomes. As reported in *Reinventing Manufacturing*, a Bay Area Council Economic Institute analysis of 2014 California employment data found that across the economy in a range of annual incomes from \$20,000 in Accommodation & Food Services to \$133,000 in Information, manufacturing jobs tend to fall at the upper end of the wage spectrum with average annual incomes of \$80,000 (see Figure D).³

FIGURE C
Wage distribution of jobs on industrial land in 2011 and 2040, compared to wage distribution for all jobs in the Bay Area in 2010



Source: Center for Community Innovation, UC Berkeley, Industrial Land and Jobs Study for the San Francisco Bay Area

FIGURE D
California Average Annual Earnings by Industry, 2014



Source: Bay Area Council Economic Institute Analysis of Quarterly Census of Employment & Wages, California EDD

Industry Clusters and the Innovation Ecosystem

The Bay Area is a leading global hub of technology innovation. The region’s rich innovation ecosystem is based on a high-skilled workforce, world-class universities and research labs, robust capital investment platforms and dense networks that enable the movement of people and ideas. Although it is one of the most expensive regions in the state, companies in many industry sectors choose to locate in the Bay Area because they work closely with the region’s technology companies.

Industrial lands provide the crucial underpinnings of industry clusters in which groups of businesses and related institutions are located near one another and derive benefits from their mutual proximity and connections. Such clusters can be the keys to supporting the growth and advancement of the regional economy. Cluster-based economic strategies make the most of economic assets already in place and leverage existing innovation networks to drive the commercialization of research and development. For such clusters to thrive in the region, land use policies must ensure that industrial space is available in appropriate locations to support already vibrant industry clusters and foster the growth of new ones.

SPOTLIGHT

Building a Biomedical Manufacturing Network

The Bay Area is a global leader in health-related innovation, pioneering advances from biotechnology to how healthcare organizations deliver care. The region’s biomedical manufacturing sector is a prime example of a vibrant industry cluster at the heart of region’s innovation ecosystem that is being supported by cluster-based strategies.

Based in the East Bay and funded by the US Department of Energy’s Office of Energy Efficiency & Renewable Energy (EERE), Bio-Manufacturing to Market is a UC Berkeley initiative which is part of the Advanced Manufacturing Jobs and Innovation Accelerator Challenge grant. It is a member of the Biomedical Manufacturing Network, which was co-founded by UC Berkeley and works to support biomedical entrepreneurship, manufacturing, and commercialization in the Bay Area.

The Biomedical Manufacturing Network was formed in 2013 after a partnership of regional entities won a US Advanced Manufacturing Jobs and Innovation Accelerator Challenge grant funded by the US

Departments of Commerce, Energy and Labor, the US Small Business Administration, and the National Institute of Standards and Technology (NIST). Today it engages more than 700 biomedical manufacturing companies in the Bay Area—the largest biomanufacturing cluster in the world—providing business services and placing interns with companies. It maintains a database of over 1,000 university and federal laboratory technologies that are available for transfer to companies, and it publishes reports on talent, manufacturing technology, and commercialization in the biomedical industry. In a partnership that operates under the Biomedical Manufacturing Network’s umbrella, Oakland’s Laney College and UC Berkeley jointly support a Bioengineering Certificate Program that offers training at both UC Berkeley and Laney College for both students and current workforce participants who need retraining.

SPOTLIGHT **Benefiting from Proximity to R&D Resources**

Throughout the development of the Bay Area’s innovation economy, the co-location of R&D and production has been a source of strength. A typical example is Finelite, an innovative energy-efficient lighting manufacturer that has benefitted from its proximity to the Bay Area’s world-class university and commercial R&D centers.

Headquartered in Union City, Finelite focuses on the design and manufacture of high-performance, environmentally sustainable LED and fluorescent lighting systems for office, healthcare, and educational facilities. Its customers range from firms like Google, Verizon, and Dell, to universities such as MIT, Stanford, and Yale. Finelite’s 182,000 square foot manufacturing facility is capable of assembling over 20,000 linear feet of lighting fixtures per day. Operating in California for 24 years, the company taps into technologies created in Silicon Valley and collaborates with the California Energy Commission to develop lighting products to meet new efficiency standards.

The company employs 270 people in Union City and has over 1,000 California employees spread across a metal fabricator operation in Los Angeles and a high-speed painting location in Livermore. Holding joint patents with the California Lighting Technology Center

at the University of California, Davis, in 2011, Finelite created several application guides to show how to cut energy usage in half without compromising lighting quality—solutions that enhance productivity and move toward net zero energy use.

SPOTLIGHT **Growing Localized Supply Chains**

Another development derived from the proximity factor in industry clusters is the formation of localized supply chains. The economic benefits of supplier location in clusters run in multiple directions. Suppliers gain from the nearby market for their output while their customers gain from easy access to a range of services. The interaction between nearby customers and suppliers can generate quicker and more innovative solutions to technical problems or demand changes, which then benefit the whole cluster. Localized supply chains have supported the growth of manufacturing in the Bay Area and have enabled high-value production to occur in close proximity to research activities. The story of auto manufacturing in Fremont provides an instructive example.

In 2010, when General Motors and Toyota closed New United Motor Manufacturing Inc. (NUMMI), their automotive joint venture in Fremont, California lost its last remaining auto manufacturing plant. The closure not only resulted in job losses at the NUMMI plant itself, but also at the firms supplying it.

That same year, Tesla purchased the Fremont factory and today has body shop welding and final vehicle assembly lines there that are capable of producing 500 units per week. At the end of 2016, Tesla was employing about 6,200 people at the Fremont site.

Tesla has made an effort to develop its supply chain close to the Fremont plant, even offering space to suppliers within the Tesla Fremont facility itself. As a result, a dynamic automotive supply chain has developed in the Bay Area.

For example, Futuris Automotive, which supplies Tesla interior components such as seats, operates out of a 160,000 square foot facility in Newark, just 15 minutes from Tesla’s Fremont factory. Originally operating inside the automaker’s Fremont plant, Futuris found a permanent home in Newark that can accommodate its

growth. At full volume, Futuris can employ 300 or more people at its plant. Eighty percent of its products are manufactured locally for Tesla.

Futuris, which is Australia-based, is not the only Tesla supplier to locate nearby. Asteelflash, a global manufacturing services company, has a Fremont location that creates motherboards for car console systems. Eclipse Automation, a Canadian company, also has a Fremont location that supplies custom automated manufacturing equipment to Tesla.

The ability of Tesla to procure parts for its cars locally not only reduces shipping costs and time, but also allows Tesla to work closely with suppliers to design products efficiently and to fix issues that may arise. This “near-shoring” of supply chains has become a key component in building localized industry clusters. Tesla’s example shows that a large anchor manufacturing facility can attract other producers and drive the development of new clusters.

SPOTLIGHT **Manufacturing in New Spaces**

The Bay Area’s innovation ecosystem contributes not only to the development of cutting edge products, but also to the creation of new modes of production. Technology is reshaping the traditional processes of reductive manufacturing, multi-component assembly, and manual labor in favor of more efficient and high-performing processes based on additive manufacturing and increasingly smart, flexible automation. Internet-empowered consumer connectedness has also created a world in which consumers want customized services and products. To meet customers’ unique needs and desires, companies are striving to deliver more personalized products by facilitating mass customization—the production of “one-offs” on demand. For several decades, mass customization has been a topic of future promise, but lately it has become more realistic as technologies like 3D printing and customer interaction platforms enable cost-effective ways to create customized offerings.

Today’s “reinvented” manufacturing sectors rely on industrial and mixed-use land in the region’s core. The continuing need for higher service levels and shorter

response times will impact how supply chains evolve and how manufacturers think about their products, footprints, and processes. Distribution points will need to be closer to consumption; more manufacturers will need to have more flexible operations or be closer to the consumer or both. In short, high-flexibility operations and on-demand production require proximity to market, which leads to new demand for industrial spaces within more urban areas.

In addition, advanced technologies, especially 3D printing, allow this reinvented manufacturing to be done on a smaller scale, relatively free of noxious impacts such as noise, so new urban manufacturers make better neighbors. The smaller scale of many operations also means that they require less space, sometimes as little as 1,000 square feet housing a small office plus a small warehouse space with a roll-up door. Industrial space is especially scarce in dense urban areas, and subdividing larger industrial buildings is expensive, as is building new industrial spaces, due to high urban land costs.

Among the organizations pioneering solutions to these problems is SFMade, a San Francisco non-profit that works to support manufacturing within the city. SFMade, through its sister non-profit PlaceMade, has partnered with the city and private developers to create the Manufacturing Foundry, a new affordable industrial space for manufacturers at 150 Hooper in San Francisco’s Potrero Hill/Design District area. Scheduled to open in mid-2018, the 50,000 square foot four-story building has a ground floor with 8,410 square feet of manufacturing space (available in spaces starting at 1,000 square feet), 6 roll-up doors, 6 person doors, and a ceiling height of 18 feet. The other three floors have approximately 12,700 square feet each (also with spaces starting at 1,000 square feet) and a ceiling height of 11 feet. The building is part of a larger, mixed-use commercial campus, and tenants will also have access to a two-bay loading dock adjacent to 150 Hooper. This affordable production space allows manufacturers to work in a collaborative community environment and is an example of a viable solution for new kinds of industrial uses needing space in the urban core.

Conversion, Retention, and Future Demand

In order to continue fostering diversity and innovation in the regional economy, the issues of conversion or retention of industrial lands, as well as future demand, need to be proactively considered in the prioritization of land use policies. The *Industrial Land and Jobs Study* undertook several regional analyses to assess the extent of industrial lands conversion to other uses that has already taken place, to estimate how much industrial land is likely to be converted in the future, and to project whether there will be enough industrial land to accommodate demand in 2040.

TABLE 2
Conversion of Industrially Zoned Parcels, 2007–2013
Cities with Residential Conversion

City	Total Industrial Parcels Converted, 2007–2013	Industrial Parcels Converted to Residential, 2007–2013
Emeryville	100	97
San Francisco	93	87
Oakland	54	22
San Jose	102	21
Santa Rosa	17	16
Richmond	32	14
Pittsburg	13	8
Berkeley	14	6
Mountain View	26	4
Hayward	61	3
Sunnyvale	21	2
Milpitas	17	2
Alameda	8	2
San Leandro	29	1
Santa Clara	21	1
Antioch	6	1
San Bruno	6	1
North Fair Oaks (unincorporated)	2	1
Graton (unincorporated)	2	1
Daly city	1	1

Source: Center for Community Innovation, UC Berkeley, Industrial Land and Jobs Study for the San Francisco Bay Area

Estimating the extent of conversion to nonindustrial uses of Bay Area land zoned as industrial-commercial, industrial-residential, or industrial-other required a multi-faceted analysis, since zoning may not reflect what is actually on the ground. In some cases, nonindustrial uses predate the industrial zoning of the area, and sometimes zoning has simply not been updated as the land has been converted to other uses. Using sampling techniques and zoning verification fieldwork, the researchers estimated that 10% of the sampled parcels currently had nonindustrial uses, which translates to about 6.5% of the region’s total industrial lands. They also used tax assessor data to analyze changes in use code on industrially zoned land between 2007 and 2013 and found that 1.1% of the industrially zoned acreage overall had changed in use during that period. The counties with the highest percentage changes were Alameda (1.8%), Santa Clara (1.7%), Sonoma (1.2%), and Contra Costa (1.1%), with Marin and San Mateo counties showing 0.7% each, San Francisco showing 0.1%, and Napa and Sonoma counties showing little or no conversion at all.

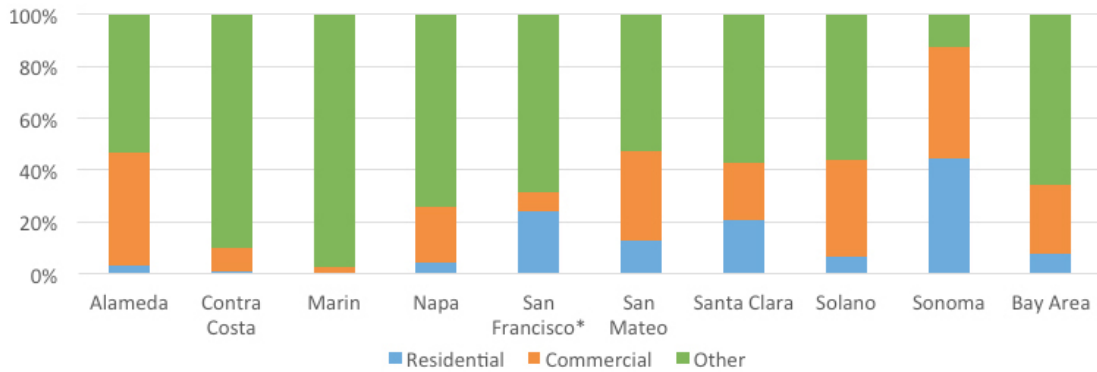
In another analysis focusing on 20 cities where industrial parcel conversion had taken place between 2007 and 2013, data was examined to determine the number of

TABLE 3
Acreage with Exclusive Industrial (EI) Zoning Plus Acreage with Industrial-Office (I-O) Zoning Conflicting with Other Designations

County	Total Acres of Land with EI Plus I-O Zoning	Acres of EI Plus I-O Land in Conflict	Percentage of EI Plus I-O Land in Conflict
Alameda	22,127	3,135	14%
Contra Costa	18,357	4,207	23%
Marin	1,426	410	29%
Napa	3,809	33	1%
San Francisco	1,971	957	49%
San Mateo	8,883	389	4%
Santa Clara	18,501	1,424	8%
Solano	11,911	4,142	35%
Sonoma	1,437	387	27%
Bay Area	88,422	15,084	17%

Source: Center for Community Innovation, UC Berkeley, Industrial Land and Jobs Study for the San Francisco Bay Area

FIGURE E
Industrial Land Conflicting with General Plan Designations



Source: Center for Community Innovation, UC Berkeley, Industrial Land and Jobs Study for the San Francisco Bay Area

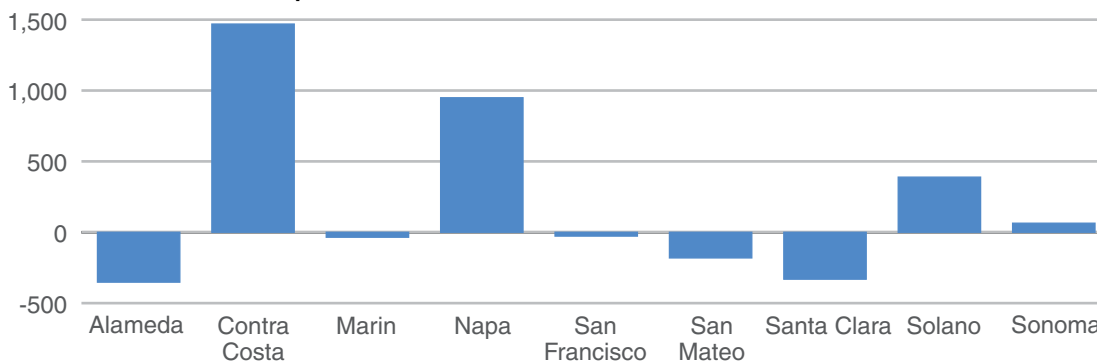
parcels converted to residential use. As shown in Table 2, in Emeryville (97) and San Francisco (87) the residential conversion shares were high compared to the numbers for Oakland (22), San Jose (21), Santa Rosa (16) and Richmond (14) which, while still significant, were quite a bit smaller.

The *Industrial Land and Jobs Study* also examined the extent to which industrially zoned land has conflicting general plan designations or overlaps with the designations of Priority Development Areas (PDAs) which are meant to help plan for future sustainable and equitable growth. Parcels now zoned for industrial use were deemed to be in conflict or overlapping if the general plan or PDA proposes future nonindustrial activities for those parcels. The overall conflict/overlap analysis focused only on land with exclusive industrial zoning or industrial-office zoning and excluded the other two mixed-use zoning categories (industrial-commercial and industrial-residential). As shown in Table 3, of the 88,422 acres

of exclusive industrial land plus industrial-office land, 15,084 acres or about 17% is in conflict with non-industrial designations (in general plans or PDAs) and is therefore susceptible to conversion.

Whether the industrial land in conflict with general plan designations is susceptible to residential, commercial or other use conversion varies across each of the nine Bay Area counties as shown in Figure E. In all counties except Sonoma, more than half of the conflicts are in the Other category, which includes a variety of general plan designations, such as parks and public facilities, that are not explicitly either residential or commercial in nature. Most of the conversion-susceptible land in Sonoma County overlaps with new residential designations (44%), and San Francisco and Santa Clara both have conflicts susceptible to residential conversion above 20%. The susceptibility to commercial conversion is greatest in Alameda, San Mateo, Solano, and Sonoma counties, which each have commercial conflict percentages over 34%.

FIGURE F
Projected 2040 Industrial Land Surpluses and Deficits



Source: Center for Community Innovation, UC Berkeley, Industrial Land and Jobs Study for the San Francisco Bay Area

After accounting for industrial lands that have already been converted to nonindustrial uses or are in conflict with other usage designations, the *Industrial Land and Jobs Study* analysis went on to forecast future industrial land supply and demand by comparing available land estimates to employment projections for 2040. Based on current occupancy, it was estimated that over the next two decades, some 49,878 jobs on industrial lands will be displaced because of planned conversions of those lands to other uses, and that an additional 2,152 acres of land would be required for relocation of those jobs. This would result in an industrial lands deficit of 208 acres in the nine-county region overall, with the largest deficits projected for the majority of counties in the urban core—Alameda, Santa Clara, and San Mateo counties—offset by surpluses occurring in the more peripheral areas of Contra Costa, Napa and (to a lesser degree) Solano counties (see Figure F).

CONCLUSION

Preserving Value for the Future

Preserving the strength of the regional economy—which derives much of its vitality from its diverse set of industry sectors and robust innovation ecosystem—requires land use policies that allow the conflict-free coexistence of industrial activities with other uses in populated areas. Such policies also help to ensure the availability of sufficient industrial lands to sustainably accommodate industrial businesses in both their current and future configurations.

NOTES

- 1 Center for Community Innovation, UC Berkeley, *Industrial Land and Jobs Study for the San Francisco Bay Area*, July 2017, <http://www.dot.ca.gov/newtech/researchreports/reports/2017/CA17-2792_FinalReport.pdf>. This UC Berkeley publication is the source for all the numerical data cited in the Industrial Land Use Patterns and the Conversion, Retention, and Future Demand sections of this brief, unless otherwise stated.
- 2 SPUR et al., *Economic Prosperity Strategy: Improving economic opportunity for the Bay Area's low- and moderate-wage workers*, October 2014, <http://www.spur.org/sites/default/files/publications_pdfs/Economic_Prospersity_Strategy_print.pdf>
- 3 Bay Area Council Economic Institute, *Reinventing Manufacturing: How the Transformation of Manufacturing Is Creating New Opportunity for California*, April 2016, <<http://www.bayareaeconomy.org/files/pdf/ReinventingMfgFullReport.pdf>>.

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