



IV.

LOOKING AHEAD TO A POST-PANDEMIC FUTURE

Research and stakeholder input for East Bay Forward identified assets, industries of opportunity, and investment trends that together indicate “bright spots” that will support a vital East Bay economy and workforce as the pandemic recedes.

The East Bay’s legacy assets, industry growth in innovation sectors, and recent venture capital investments serve as critical drivers as we emerge from the pandemic.

Spring poppies in the Pleasanton Hills. Photo by: Dawn Humphrey.

This section is organized as follows:

- The first set of findings in this section identify the area's longstanding, fixed-in-place "legacy assets" that will continue to underpin the East Bay economy.
- The second set of findings examine industries that are well-positioned within the East Bay to continue attracting investment, growing job opportunities, and driving innovation.
- The final set of findings examines recent trends in East Bay venture capital investment as a further measure of which industries and activities are driving innovation and business growth.

LEGACY ASSETS

The East Bay's "legacy assets" consist of relatively permanent, longstanding, and fixed-in-place components that support and shape the area's economy. These are fundamental factors that establish the East Bay's basic competitive strengths compared to other areas, including assets such as major institutions, infrastructure, land use and land availability, location, and geographic features.

The map in Figure 24 depicts several of the East Bay's major assets, including:

- **Colleges & Universities:** UC Berkeley engages in cutting-edge research and development activities and attracts a highly skilled talent pool to the region. Many of the East Bay's innovation clusters—such as Biomedical and CleanTech—all have strong connections to the university. Cal State East Bay offers a wide range of undergraduate and graduate degree programs for its diverse student body, while the East Bay's other four-year and community colleges provide a robust network of education institutions and training for residents.
- **Oakland International Airport** supports both passenger and freight transportation needs for the East Bay's businesses and residents.
- **Major Ports:** The Port of Oakland seaport is one of the ten busiest container ports in the United States by cargo volume and supports the East Bay's role as a transshipment point for goods. The seaport also provides a means for the East Bay's businesses (especially manufacturing businesses) to efficiently engage with a global supply chain. The Port of Richmond is also a major support for Contra Costa County's local economy, providing bulk and liquid cargo transportation.
- **National Laboratories:** The East Bay's three national laboratories—Lawrence Berkeley National Lab, Lawrence Livermore National Lab, and Sandia National Lab—are national leaders in scientific research and development, and drive innovation and high-tech startup activity in the East Bay.
- **Transportation Infrastructure:** The East Bay's numerous BART stations support resident access to jobs, including a regional hub at Downtown Oakland. The East Bay also features a robust freeway network that enables worker commute access and supports the region's goods movement economy.
- **Parks:** The East Bay's large and diverse system of parks is a unique amenity that supports resident quality of life and attracts visitors. A 2017 study for the East Bay Regional Parks District found that EBRPD parks generate \$200 million annually in additional economic activity.¹⁷

Other notable legacy assets in the East Bay include:

- **Industrial lands:** These lands serve as an invaluable asset that provides flexibility to businesses and hosts the East Bay's

goods movement activities, manufacturing industries, and many innovation-oriented uses like research and development, prototype development, and advanced manufacturing. Businesses at these industrial lands also provide diverse high-quality job opportunities for East Bay and Bay Area residents.

- Regionally Significant Development Opportunity Sites:** Examples of these opportunity sites include the former Concord Naval Weapons Station and Oakland Coliseum; the East Bay generally includes a unique mix of larger development opportunities within an urbanized setting of the Bay Area.
- Unique and Diverse Arts and Culture Assets:** The East Bay's vast collection of arts and culture organizations, institutions, and venues express the rich diversity of the East Bay's cultures and communities. Not only do these assets provide a sense of belonging and inclusivity for residents, they also generate

economic activity and are critical contributors to the East Bay's "cachet" as a residential and business location.

INDUSTRIES TO WATCH

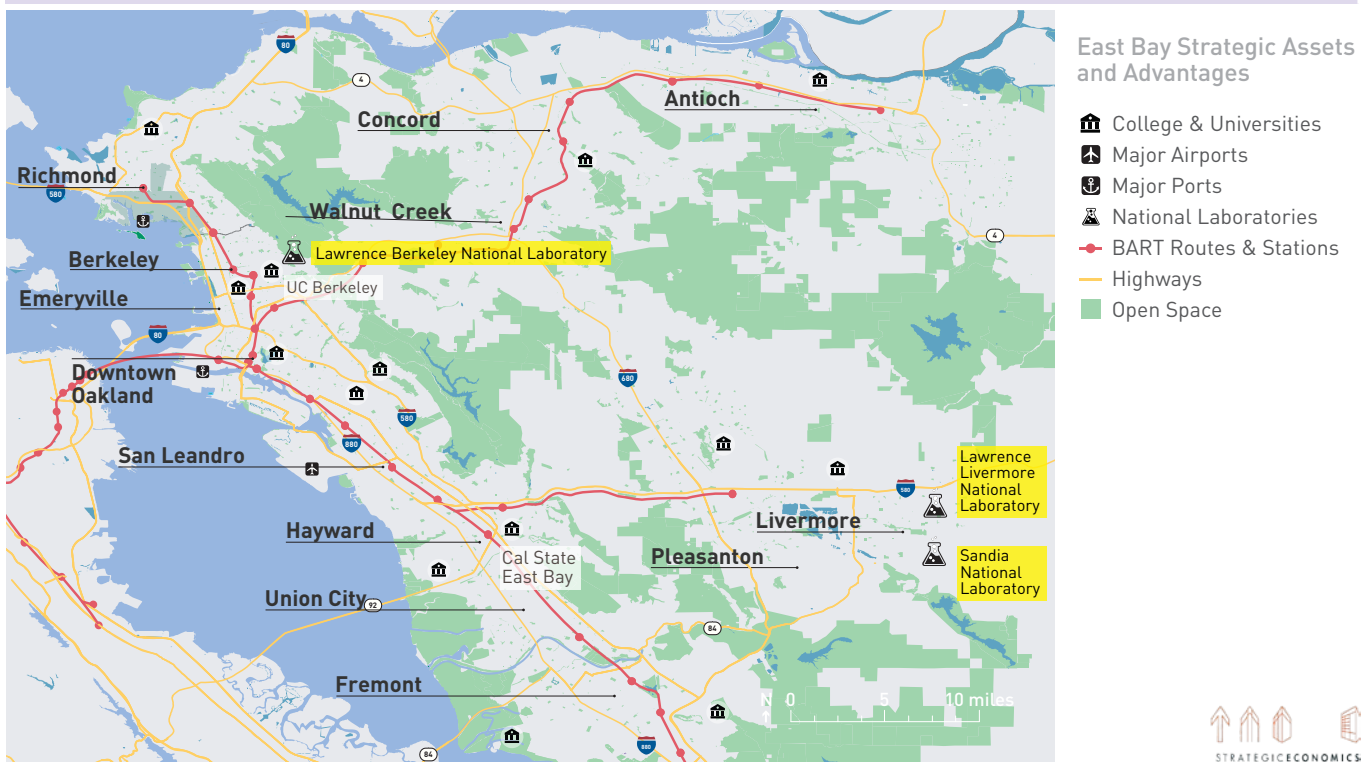
The following section describes five industries or industry groups that drive economic output in the East Bay and are positioned to generate substantial innovation, investment, and job and business growth over the coming years. The priorities of East Bay Forward build on these "industries to watch," and this deeper analysis of those industries will assist in implementing the priorities. The industries include: 1) Manufacturing, 2) Creative Technology and Design, 3) Biomedical, 4) CleanTech, and 5) Goods Movement and Logistics.

Manufacturing

While the COVID-19 pandemic has caused major disruptions to the East Bay's economy, manufacturing has emerged as a strong and resilient sector that will be key

FIGURE 24

Strategic Assets and Advantages in the East Bay



to the region's recovery from the economic impacts of COVID-19. The manufacturing sector in the East Bay is dynamic and diverse, consisting of biomedical/life sciences, chemicals, electronics, food & beverage, machinery, metals, and transportation equipment manufacturing and more. The manufacturing sector in the East Bay is highly intertwined with the East Bay's technology sector, and innovations in the digitization of the supply chain, automation, AI, and sustainable operations are part of an accelerated rate of change for manufacturing. To achieve a broad-based recovery, companies and the public sector need to ensure that these innovations are adopted by small- to medium-sized companies in order to share in these gains and achieve the highest growth possible.

Manufacturing industry businesses and jobs generate an outsized impact on the East Bay's economic output and high-quality job opportunities. Manufacturing jobs constitute eight percent of East Bay employment, grew 22 percent between 2014 and 2019, and are re-

sponsible for relatively high economic output. Manufacturing also provides a higher share of entry-level, middle-wage jobs compared to other sectors, and available literature estimates that each job in manufacturing is associated with between five and seven additional jobs in the regional economy. EMSI estimates that the average earnings per manufacturing industry job in 2020 was over \$129,000 in Alameda County and \$140,000 in Contra Costa County (compared to \$97,000 and \$86,000, respectively, for all jobs). Manufacturing businesses tend to provide robust on-the-job training and career pathway opportunities, as well as offer low barriers to entry in terms of experience and educational levels required.

The largest manufacturing subsector based on total employment is Transportation Equipment Manufacturing (15,458 jobs). This sector which grew rapidly over the 2014 to 2019 period due to the opening of the Tesla plant in Southern Alameda after the NUMMI plant had closed in this same location in 2010. Tesla also contributes to the East Bay's largest overall concentration of manufacturing jobs in the Southern and Central

FIGURE 25**Top 10 Manufacturing Sectors by East Bay Employment, 2019**

Industry Subsector	2019 Jobs	Location Quotient Compared to Bay Area	Growth Rate, 2014-2019
Transportation Equipment Manufacturing	15,458	2.0	132%
Food Manufacturing	11,846	1.5	12%
Machinery Manufacturing	8,354	1.3	35%
Fabricated Metal Product Manufacturing	7,457	1.1	9%
Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	7,259	0.8	38%
Medical Equipment and Supplies Manufacturing	6,671	1.7	47%
Semiconductor and Other Electronic Component Manufacturing	6,483	0.4	2%
Petroleum and Coal Products Manufacturing	4,725	3.0	1%
Computer and Peripheral Equipment Manufacturing	4,228	0.2	22%
Pharmaceutical and Medicine Manufacturing	3,739	0.6	24%

Source: EMSI, 2021; Strategic Economics, 2021.

Alameda subareas, which together account for 62 percent of East Bay manufacturing jobs.

Food manufacturing is one of the largest manufacturing subsectors in the East Bay, providing over 11,800 jobs as of 2019. Bakeries, which is one of the largest industry subsectors, are located throughout the region since these businesses need to be located close to their customers. There are other noteworthy East Bay concentrations of food-related activities; in Central Alameda, there are traditional canning, meat processing, and confection firms. Northern Alameda has a concentration of innovative food activities that conduct research and development on plant-based dairy and meat substitutes.

East Bay manufacturing is directly connected to the Bay Area's innovation-oriented activities in computer technology, electronics, and biomedicine. This includes firms engaged in activities related to electronic product manufacturing, such as manufacturing of semiconductors and other electronic components, computer-related products, and navigational/electromedical equipment. The East Bay also has a strong concentration of firms that manufacture medical equipment and firms that engage in biotechnology/biomedical research related to pharmaceuticals and other drugs. As Figure 25 shows, a few of these technology related manufacturing firms have a location quotient of less than one, indicating that these subsectors are not particularly concentrated in the East Bay, but are growing rapidly and play an important role in the East Bay's overall manufacturing ecosystem.

A larger share of manufacturing employment in Contra Costa County is focused on legacy manufacturing activities, with 27 percent of the county's manufacturing jobs in petroleum production as of 2019. As the East Bay becomes more focused on climate change resiliency, there may be new opportunities for East Bay economic development leaders to aid legacy firms in transitioning to activities that support those resiliency goals and ensure ongoing availability of manufacturing jobs.

Global trends are colliding to create more possibilities for a return of manufacturing to the East Bay than we have seen in many decades. The COVID-19 pandemic, global supply chain disruptions, geopolitical considerations, transportation costs, and labor costs are producing a period of potential for a reshoring of East Bay manufacturing, with great opportunity particularly for small- to medium-sized manufacturers and the growth of middle-wage jobs.

Creative Technology and Design

In the East Bay, there are multiple subsectors that engage in professional activities relying on the use of creative and high-tech processes and design. These industries can be categorized within a "creative technology and design" industry group that, while dominated by businesses related to the Bay Area's computer technology industry and scientific research and development, also includes jobs in architecture and engineering, media, and technical consulting.

Creative technology and design businesses are drawn to the East Bay's skilled workforce, innovative anchor institutions, transportation access, and relatively lower real estate costs.

The East Bay offers easy access to the East Bay and Bay Area's large skilled workforce, plus relatively low-cost commercial real estate compared to Silicon Valley and San Francisco. UC Berkeley and the national laboratories also foster a creative and innovative environment. Creative technology firms typically occupy office spaces and research facilities, and they tend to co-locate near similar firms. They are concentrated in Northern Alameda, which has the strongest connection to San Francisco through both BART and the Bay Bridge. The Tri-Valley, which historically has attracted employers seeking campus-sized offices and benefits from its location on BART and the I-580 and I-680 corridors, also has a sizable share of these firms. Southern Alameda also includes a concentration of these firms, in part due to its proximity to Silicon Valley.

Professional Services is one of the largest sectors by employment in the East Bay, although employment in the sector is less concentrated in the East Bay than it is in the Bay Area. As shown in Figure 26, jobs in Architecture and Engineering are particularly concentrated in the East Bay, and the East Bay also has a large number of jobs in the “Management, Scientific, and Technical Consulting Services” sector. The Computer Systems Design sector and the Scientific Research sector are both less concentrated in the East Bay relative to the region, but are the two largest Professional Services subsectors in the East Bay by number of jobs—echoing the important role of the technology industry and research and development in the Bay Area overall.

The Information sector is not as concentrated in the East Bay as it is in the region, and the sector overall is a small share of East Bay employment; however, certain subsectors

have grown in recent years in the East Bay. The sector benefits from the presence of marquee employers, particularly in Northern Alameda (Pixar, Square) and Tri-Valley (Workday, Oracle). The Software Publishing subsector more than doubled to almost 4,000 jobs in the East Bay from 2014 to 2019, and Data Processing Services, which added 6,000 jobs, grew 10-fold during this period. The Motion Picture sector also grew steadily, largely tied to Pixar’s presence in Northern Alameda.

Biomedical

The biomedical industry includes businesses engaged in the fields of biotechnology, pharmaceutical development, medical equipment and devices, genomics, and digital healthcare. This industry also includes contract manufacturers and contract laboratories that play critical roles in the research and development process associated with biomedical activities.¹⁸

FIGURE 26

Select Subsectors in Creative Technology and Design

Industry Subsector	2019 Jobs	Location Quotient Compared to Bay Area	Growth Rate, 2014-2019
Professional Services			
Computer Systems Design and Related Services	26,083	0.4	-9%
Scientific Research and Development Services	22,302	0.9	39%
Architectural, Engineering, and Related Services	19,748	1.1	16%
Management, Scientific, and Technical Consulting Services	19,525	0.9	-2%
Legal Services	10,507	0.8	4%
Other Professional, Scientific, and Technical Services	7,588	1.1	14%
Specialized Design Services	3,829	0.9	6%
Information			
Data Processing, Hosting, and Related Services	6,878	0.7	1027%
Software Publishers	6,708	0.3	131%
Wired and Wireless Telecommunications Carriers	4,958	1.3	-39%
Motion Picture and Video Industries	4,536	1.2	13%

Source: EMSI, 2021; Strategic Economics, 2021.

¹⁸ Note that the biomedical industry is difficult to track through NAICS industry codes since biomedical firms are often found within multiple industry sectors such as Manufacturing, “Professional, Scientific, and Technical Services,” and Healthcare. Therefore, much of this report’s data on the biomedical industry in the East Bay comes from on-the-ground research collected by the Biomedical Manufacturing Network, a biomedical industry association in the Bay Area. Their research for the East Bay focuses on Alameda County, where most biomedical activity in the East Bay is located.

The East Bay is a critical part of the Bay Area biomedical ecosystem, despite representing a relatively small share of the region's enormous number of jobs and businesses in the industry. The Bay Area is one of the world's dominant biomedical and biotechnology hubs, competing with just a few other locations in the United States such as Boston and San Diego. The industry's importance in the East Bay was underscored during the COVID-19 pandemic, when East Bay biomedical companies produced biopharmaceuticals, ventilators, and test kits in the fight against the coronavirus. Although the East Bay represents a relatively small share of the Bay Area's biomedical industry, the region plays a specialized role as a distinct innovation ecosystem with strong relationships among the national laboratories, universities, and industry associations and accelerators.

The East Bay's biomedical industry employment is concentrated in a diverse mix of activities. Figure 26 shows the composition and employment growth trends of biomedical business categories in Alameda County. There are approximately 28,500 jobs in the biomedical industry in Alameda County, across 545 businesses. The number of biomedical jobs in Alameda County grew by 37 percent from 2014 to 2020, with most of that growth associated with Medical Equipment and Biotechnology firms. These trends indicate that Alameda County is poised for growth in multiple Bio-

medical industry categories and that this trend may offer additional opportunities for Contra Costa County to attract future growth in these sectors as well. Although similar data was unavailable for Contra Costa County, it is important to note that a smaller but significant cluster of businesses exists there, most notably in Richmond which includes the headquarters of Bio-Rad laboratories and JOINN Innovation Park.

The East Bay's biomedical industry attracts substantial venture capital investment. Bio-medical firms in the East Bay were awarded over \$1.5 billion in venture capital investment in 2020, accounting for one-fourth of total venture capital investment that year. Firms with the largest awards in 2020 included: Zymergen (biomanufacturing); RefleXion Medical (biology-guided radiotherapy); and Geltor (biodesign for plant-based products); and BioAge (drug therapy).

Different subareas within the East Bay play different roles in the biomedical industry based on their competitive assets:

- **Emeryville and Berkeley** have a robust and diverse concentration of biomedical startups, many of which focus on biotechnology and medical devices. These startups are tightly linked to UC Berkeley and Lawrence Berkeley National Lab, with over half of the 165 firms in Emeryville and Berkeley affiliated with these two institutions. While Northern Alameda's biomedical firms are mostly startups, major biotechnology companies such as Bayer, Grifols, and Novartis are also located there.
- The **Southern Alameda** cities of Fremont, Newark and Union City, as well as Alameda in Central Alameda, provide the manufacturing space for biomedical businesses that are ready to scale up and begin production. Fremont strategically leveraged its high supply of lower-cost flex space to attract contract manufacturers for biomedical products. Today, it has a strong concentra-

FIGURE 27

Biomedical Employment in Alameda County, 2014-2020

Industry Subsector	2014	2020	Change, 2014-2020	Percent Change, 2014-2020
Medical Equipment	7,658	11,011	3,353	44%
Biotechnology	3,688	6,770	3,082	84%
Pharmaceuticals	5,408	4,451	-957	-18%
Medical Devices	2,713	3,258	545	20%
Digital Healthcare	654	1,763	1,109	170%
Genomics	749	1,297	548	73%
Total	20,870	28,550	7,680	37%

Source: Biomedical Manufacturing Network, 2021; Strategic Economics, 2021.

tion of firms involved in medical device and equipment manufacturing. Biomedical firms in Southern Alameda are unique compared to the Bay Area because over half of their jobs are available to workers with high school degrees or two-year degrees.

- The **Tri-Valley** also has a smaller amount of R&D and production activity, benefitting from proximity to Sandia and Lawrence Livermore national labs, though the Tri-Valley is more of a secondary location for biomedical activities.
- Richmond, in **Western Contra Costa**, is also home to a smaller cluster of biomedical businesses near the I-580 corridor.

Cleantech

CleanTech, also sometimes called “Green-Tech” refers to an economic cluster that focuses on improving environmental quality. Since the CleanTech cluster focuses on both processes and products, its constituent activities are found across a wide range of industries. Examples of CleanTech activities include clean energy and biofuels, green building, green transportation and infrastructure, waste management, and other products and processes that reduce waste and greenhouse gas emissions.

The East Bay’s CleanTech cluster is one of the most robust in the state of California, and the East Bay is a leader in the research and development of biofuels and alternative fuels.

As of 2008, (when East Bay-specific CleanTech employment research was conducted), the East Bay had approximately 30,000 CleanTech jobs, making it the largest concentration of CleanTech employment in the Bay Area.¹⁹ Many of the East Bay’s CleanTech jobs are associated with the three national labs and UC Berkeley, which all engage in cutting-edge research on clean energy and other topics. The presence of the national labs has historically weighted the composition of the East Bay’s CleanTech cluster toward green energy.

The East Bay’s CleanTech cluster benefits from the area’s expansive network of firms involved in scientific research and development, advanced manufacturing, and construction, as well as the East Bay’s industrial land supply. The East Bay has the right mix of assets to support ongoing growth of the CleanTech industry: the East Bay’s strengths in research and development contribute to development and commercialization of CleanTech technologies; expertise in advanced manufacturing allows for scaling up and producing new technologies; and the large construction industry supports deployment of new on-site technologies and infrastructure such as electric vehicle charging stations, solar panels, and other new renewable power generation facilities. The East Bay’s large industrial land supply supports the CleanTech industry by accommodating R&D, manufacturing, and construction uses.

In 2020, CleanTech firms were awarded \$636 million in venture capital funding, which was 10 percent of the East Bay’s total funding that year. Firms receiving the largest awards were: Astra (space rocket manufacturer); MycoWorks (fungi-based materials); Checkerspot (plant-based materials for industrial applications); and Natel Energy (hydropower provider).

CleanTech is an industry that will continue to evolve and grow policymakers, investors, and others adopt net-zero carbon emission goals.

The definition of CleanTech continues to expand as new innovation occurs; firms that engage with climate resiliency in broader, indirect ways, could also be considered CleanTech, such as firms in the East Bay’s plant-based food R&D cluster. The East Bay’s substantial presence of the CleanTech industry is poised to continue growing as society and the government continue efforts to fight climate change and as decarbonization efforts touch more areas of the economy.

19 Karen Chapple and Malo Hutson, “Innovating the Green Economy in California Regions,” UC Berkeley, 2008.

Goods Movement and Logistics

The East Bay plays a crucial role in the megaregion's goods movement and logistics ecosystem. These activities are found within subsectors in both the Transportation and Warehousing sector and the Wholesale Trade sector. The East Bay's transportation infrastructure and large supply of the Bay Area's industrial land supports these activities, providing space for warehouses, vehicle storage, and other distribution facilities.

Four primary assets anchor the goods movement industry in the East Bay:

- The **Port of Oakland** seaport is one of the busiest container ports in the United

FIGURE 28

Logistics Employment in the East Bay, 2014 to 2019

Industry Subsector	2019 Jobs	Location Quotient Compared to Bay Area	Growth Rate, 2014-2019
Wholesale Trade			
Merchant Wholesalers, Durable Goods	26,030	1.3	9%
Merchant Wholesalers, Non-durable Goods	17,814	1.4	-6%
Transportation and Warehousing			
Truck Transportation	10,800	1.8	28%
Couriers and Messengers	10,093	1.3	39%
Warehousing and Storage	6,471	2.4	68%
Support Activities for Transportation	5,656	1.0	4%
Air Transportation	3,234	0.6	15%
Water Transportation	1,234	2.1	15%
Rail Transportation	584	1.9	-9%

Source: EMSI, 2021; Strategic Economics, 2021.

States. In 2019, the Port of Oakland was the eighth busiest in terms of Container TEUs,²⁰ and was the third-busiest in the West Coast after Los Angeles and Long Beach.²¹ The port is currently in the process of developing a new logistics center on the 360-acre former Oakland Army Base. This project will enhance the port's rail connections and make the port more competitive for rail exports, a large share of which are agricultural products.²² The Port of Oakland as a whole is also a major job generator, estimated to be directly and indirectly responsible for over 84,000 Bay Area jobs.²³

- The **Oakland International Airport**, which is in Central Alameda, is also operated by the Port of Oakland. It is one of the top twenty airports in the nation in terms of the amount of air freight handled.²⁴
- The **Port of Richmond**, in the Western Contra Costa subarea, is a bulk cargo port. It is tightly intertwined with the Northern Waterfront's history, which was a key manufacturing hub for processing raw commodities during the early 20th century. The Port of Richmond still plays an important role in Contra Costa County's local economy. As of 2019, it was the 24th busiest port in the nation in terms of tonnage.²⁵ Over 75 percent of the goods/commodities that move through the Port are associated with the oil and gas industry, which continues to be prominent in Contra Costa County.²⁶
- The East Bay's **location and transportation infrastructure** also support the goods movement industry by providing immediate access to a large population and business base, and by allowing effective

20 TEU: Twenty-foot equivalent unit, a standard measurement for ports that focus on container shipment. One TEU is equivalent to one container.

21 Bureau of Transportation Statistics, [Workbook: PortProfiles2020 \(dot.gov\)](https://www.bts.gov/publications/workbook/2020/port_profiles).

22 PortofOakland.com, <https://www.portofoakland.com/press-releases/press-release-371/>; Bill Mongelluzzo, "Logistics operations move closer to docks" *Journal of Commerce*, 2018; Bill Mongelluzzo, "New rail transfer yard extends Oakland's export reach," *Journal of Commerce*, 2016.

23 Port of Oakland and Martin Associates, "The Economic Impact of the Port of Oakland," 9 October 2018. <https://www.portofoakland.com/economic-impact-report/economic-impact-report/>

24 OaklandAirport.com.

25 Bureau of Transportation Statistics, [Workbook: PortProfiles2020 \(dot.gov\)](https://www.bts.gov/publications/workbook/2020/port_profiles).

26 Bureau of Transportation Statistics, [Workbook: PortProfiles2020 \(dot.gov\)](https://www.bts.gov/publications/workbook/2020/port_profiles).

distribution via freight rail and freeway connections to California and the nation.

The logistics industry accounts for six percent of jobs in the East Bay--approximately 92,000 jobs—with rapid growth in the “Transportation and Warehousing” sector. The logistics industry’s jobs are roughly divided between the Wholesale Trade and “Transportation and Warehousing” industry sectors, and both sectors are slightly more concentrated in the East Bay than they are in the Bay Area.²⁷ The “Transportation and Warehousing” sector grew by 31 percent over the 2014 to 2019 period, adding nearly 11,000 jobs and outpacing the sector’s job growth in the Bay Area. Employment in Wholesale Trade was steady. The “Transportation and Warehousing” sector is positioned for continued growth in the East Bay as Ecommerce continues to capture a larger share of retail spending and creates demand for distribution facilities and services. The employment trends for the primary subsectors in the logistics industry are shown in Figure 28. The largest subsectors in “Transportation and Warehousing” are Truck Transportation, Couriers and Messengers, and Warehousing and Storage. These three subsectors grew rapidly from 2014 to 2019, with growth rates between 28 percent and 68 percent.

Most logistics activity in the East Bay is concentrated in Alameda County along Interstate 880, in areas with industrial land and convenient access to the Port of Oakland. Central Alameda has the largest concentration of logistics activities, with 35 percent of logistics jobs in the East Bay. Central Alameda also accounts for a large share of the job growth in the “Transportation and Warehousing” sector. Central Alameda alone added over 4,000 jobs in that sector from 2014 to 2019.

VENTURE CAPITAL INVESTMENTS

Venture capital investments in the East Bay indicate the types of businesses and industries poised for growth and also serve as a measure of the East Bay’s competitiveness for innovation-oriented businesses. East Bay Forward evaluated detailed data from Pitchbook on venture capital funding awards in the East Bay and Bay Area in 2020.

While venture capital investment in the East Bay is still relatively small compared to San Francisco and Silicon Valley,²⁸ the East Bay’s gains are substantial and growing. Despite the East Bay’s smaller share of Bay Area investment, the East Bay’s total venture capital investment in 2020 was still greater than the award totals for every state but two²⁹ besides California itself. Figure 29 shows the total venture capital investment for East Bay firms from 2012 to 2020.

The East Bay’s investment awards are diversified across industries. Figure 30 shows the share of investment by industry category in the East Bay, San Francisco, San Mateo County, and Santa Clara County. In San Francisco and Santa Clara counties, most investments are associated with Software firms. In contrast, the East Bay’s awards are relatively distributed across industries, including Software, Biotechnology, and CleanTech.³⁰

Venture Capital Specializations in the East Bay

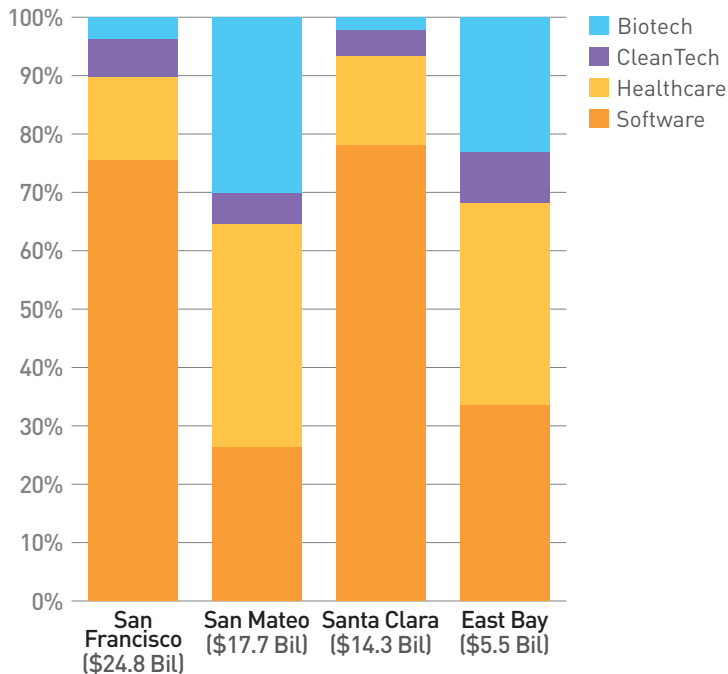
The 2020 deal-level data for the East Bay includes 500 deals, ranging from Early and Later State VC, which together account for over 90 percent of the total funding awarded, as well as Angel, Accelerator/Incubator, Grant, and

27 Wholesale Trade has a location quotient of 1.3, and Transportation and Warehousing as a location quotient of 1.2, compared to the Bay Area.

28 Silicon Valley includes Santa Clara and San Mateo counties.

29 New York and Massachusetts were awarded more funds than the East Bay in 2020.

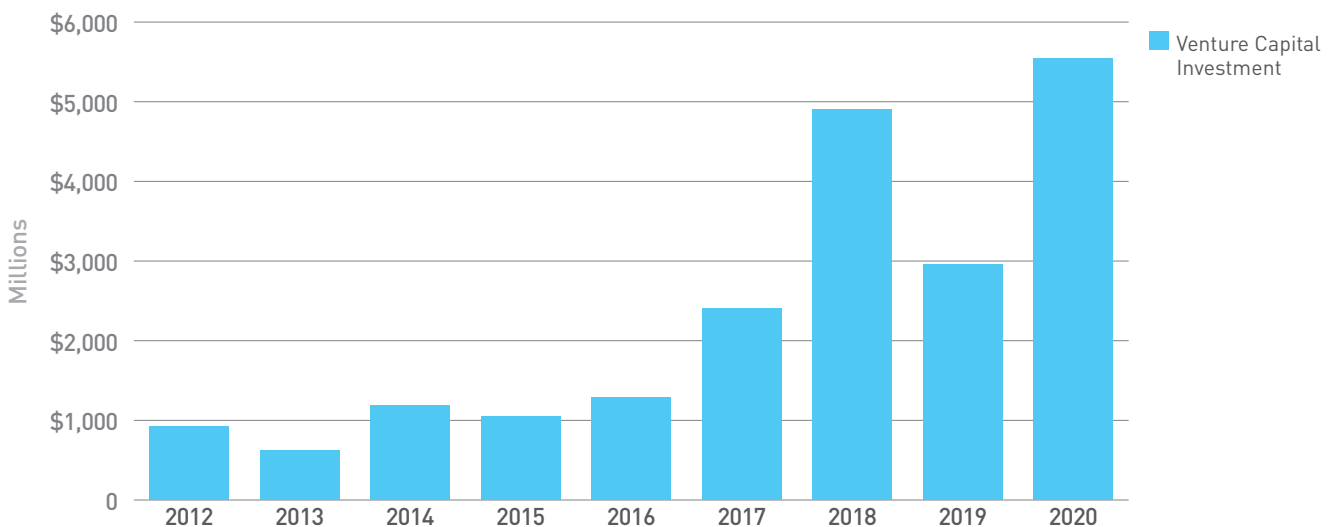
30 These categories are defined by Pitchbook and are more aggregated than the categories described in the remainder of this analysis.

FIGURE 30**Venture Capital Investment by Category across Bay Area Subregions, 2020**

Source: Pitchbook, 2021; Strategic Economics, 2021.

Crowdfunding deals. The composition of these different deal types by total funding and deal count are shown in Figure 31.

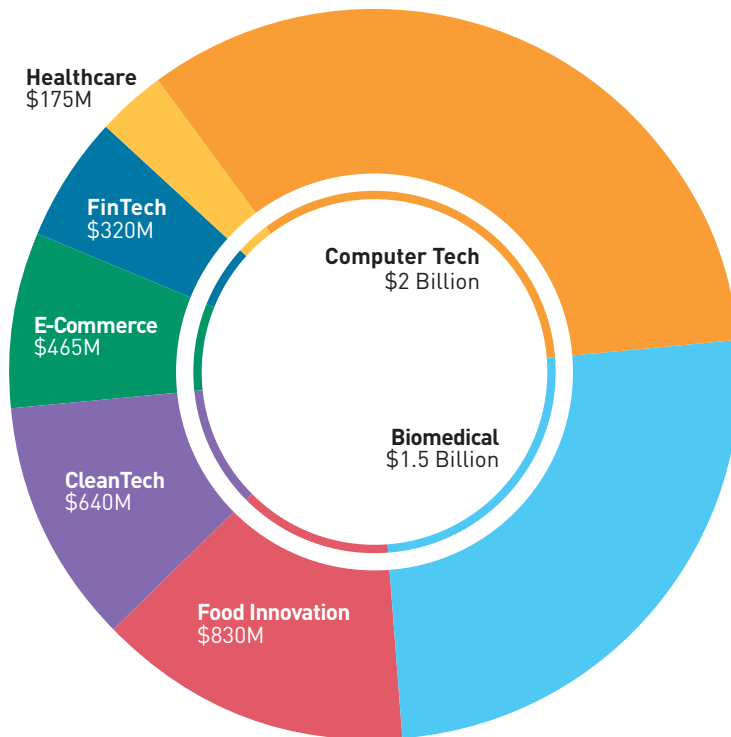
The categories of venture capital investment reflect a combination of the East Bay's unique strengths within the Bay Area and strengths of the Bay Area overall. Figure 32 shows the breakdown of award funding by firm category for 2020 in the East Bay, and Figure 33 shows the firms that received the top 20 largest awards in the East Bay in 2020. A plurality of funding was awarded to Computer Technology firms (referred to as "Computer Tech" throughout this section), and sizeable awards also went to firms in Biomedical, Healthcare, and CleanTech, as well as Ecommerce, and FinTech. There was also a notable concentration of funding for firms involved in Food Innovation, particularly in research and development of plant-based substitutes for traditional animal products.

FIGURE 29**Venture Capital Investment in the East Bay, 2012-2020**

Source: East Bay EDA Economic Outlook reports, 2013-2018/19; Pitchbook, 2021; Strategic Economics, 2021.

FIGURE 32

Venture Capital Investment Funding in the East Bay by Category, 2020



Note: The categories used in this figure are customized based on the establishment-level data. They offer more detail than Figure a, which is just based on aggregate-level data for the Bay Area subregions.

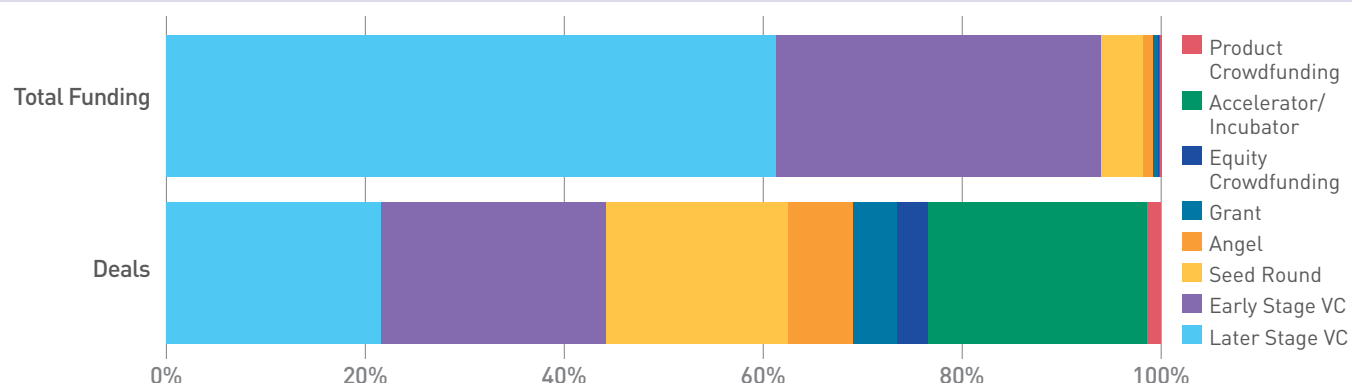
Source: Pitchbook, 2021; Strategic Economics, 2021.

The following specific activities attracted notable venture capital investment in the East Bay in 2020:

- Among the **Computer Tech** firms that received awards, the largest were associated with activities related to autonomous vehicles, cloud-based productivity software, semiconductors, as well as artificial intelligence (AI) and cybersecurity.
- **Biomedical** firms received a quarter of total awards. Some of the largest awards involved medical screening and treatment development, medical devices development, drug discovery, and vaccine research.
- There was a heightened focus on **environmental sustainability** and climate change resiliency across sectors, and firms received funding for activities in renewable energy, building decarbonization, plant-based food and textile development, and agriculture. **CleanTech** awards accounted for 10 percent of venture capital funding in 2020, and awards related to **Food Innovation** accounted for 14 percent. Most of the funding in this group involved tech-enabled agricultural and food manufacturing innovations.
- There were many investments in firms associated with development of software applications to support **Ecommerce** payment solutions, and **FinTech** firms focused on developing financial trading or investment tools. These two categories together con-

FIGURE 31

East Bay Venture Capital Awards by Deal Type and Total Funding, 2020



Source: East Bay EDA Economic Outlook reports, 2013-2018/19; Pitchbook, 2021; Strategic Economics, 2021.

stituted 13 percent of 2020 venture capital investment.

- Three percent of venture capital awards went to firms involved in innovating systems in the **Healthcare** industry. These firms create high-tech tools to assist care providers with patient services and improve the management of healthcare facilities.

Based on this data, the following patterns emerged in 2020:

- **One-half of venture capital funding in 2020 in the East Bay went to firms in a diversified set of categories in Northern Alameda (Figure 35).** Northern Alam-

eda, which includes Alameda, Emeryville, Berkeley, and Downtown Oakland, attracted a large amount of investment in Bio-tech/Biomed, as well as in Computer Tech, Food Innovation, CleanTech and FinTech.

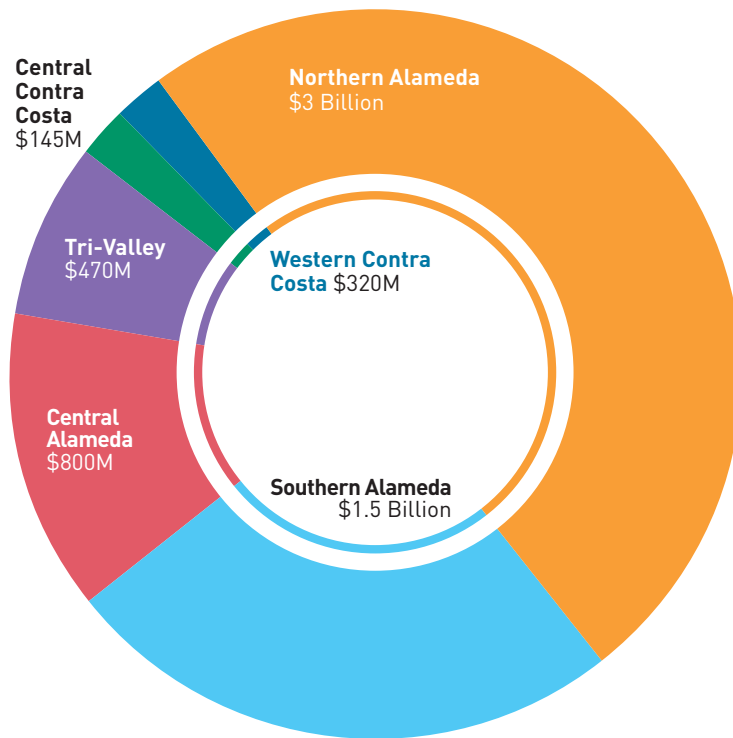
- **Southern Alameda firms were awarded one-fourth of the East Bay's total funding in 2020.** The funding in Southern Alameda, which borders Santa Clara County, is similar to investment patterns in Silicon Valley, where most funding goes to Computer Tech firms. In Southern Alameda, over 70 percent of venture capital funding went to these firms.

FIGURE 33

Top 20 Venture Capital Awards in the East Bay in 2020

Company Name	Description	Category	Deal Size (in millions)	Company City
Pony.ai	Autonomous vehicles	Computer Tech	\$829	Fremont
Zymergen	Bio-manufacturing	Biomedical	\$350	Emeryville
Perfect Day	Plant-based dairy	Food Innovation	\$300	Emeryville
Upside Foods	Plant-based meat	Food Innovation	\$186	San Leandro
Marqeta	Payment processing application	FinTech	\$150	Oakland
Tekion	Automobile retail platform	Ecommerce	\$150	San Ramon
Astra	Space rocket manufacturer	CleanTech	\$100	Alameda
Fivetran	Data integration platform	Computer Tech	\$100	Oakland
Pivot Bio	Microbial nitrogen fertilizer	Food Innovation	\$100	Berkeley
RefleXion Medical	Biology-focused radiotherapy treatment	Biomedical	\$100	Hayward
Geltor	Wellness biodesign products	Biomedical	\$91	San Leandro
BioAge	Drug therapy for extending human lifespan	Biomedical	\$90	Richmond
Halio.	Smart-tinting glass	CleanTech	\$87	Hayward
Good Eggs	Sustainable online grocery platform	Ecommerce	\$80	Oakland
Rigetti	Semiconductor developer	Computer Tech	\$79	Berkeley
Everlaw	Litigation platform	Computer Tech	\$78	Oakland
4DMT	Gene therapy	Biomedical	\$75	Emeryville
Truepill	Healthcare services platform	Ecommerce	\$75	Hayward
Rain Therapeutics	Precision cancer therapy	Biomedical	\$73	Newark
Callisto Media	Big data media publisher	Computer Tech	\$70	Emeryville

Source: Pitchbook, 2021; Strategic Economics, 2021.

FIGURE 34**Venture Capital Funding by Subarea, 2020**

Source: Pitchbook, 2021; Strategic Economics, 2021.

- **Central Alameda firms received 13 percent of total funding.** Firms in Central Alameda reflect the East Bay's unique strengths, as the firm categories that received the largest awards were in CleanTech, Biomedical, and Food Innovation.
- **Tri-Valley firms accounted for eight percent of total funding in 2020.** Over 60 percent of funding in Tri-Valley went to firms in Ecommerce and Computer Tech.
- **Four percent of funding was awarded to firms in Western and Central Contra Costa.** Most funding in Central Contra Costa is associated with Computer Tech, and most in Western Contra Costa is associated with Biotech/Biomed. There were no funding awards for firms in Eastern Contra Costa.

FIGURE 35**Venture Capital Investment by Category and Subarea, 2020**

	Biomedical	Computer Tech	Food Innovation	CleanTech	FinTech	Ecommerce	Healthcare	Total
Northern Alameda	14.5%	10.7%	9.2%	6.1%	4.6%	3.0%	1.8%	49.8%
Southern Alameda	4.2%	17.5%	0.3%	1.1%	0.3%	0.9%	0.2%	24.4%
Central Alameda	4.9%	0.9%	3.1%	2.5%	0.0%	1.4%	0.5%	13.2%
Tri-Valley	0.6%	2.8%	0.6%	0.9%	0.4%	2.5%	0.0%	7.8%
Central Contra Costa	0.1%	1.6%	0.3%	0.0%	0.0%	0.1%	0.4%	2.4%
Western Contra Costa	1.5%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	2.0%
Total	25.8%	33.4%	13.9%	10.6%	5.3%	7.8%	2.9%	100%

Notes: (a) The establishment-level data varies slightly from the aggregate subregional data shown in preceding Pitchbook data. The establishment-level data indicated there was \$6 billion in funding in 2020; however, this table excludes deals under \$500,000 and therefore total funding associated with this table is \$5.9 billion. (b) The categories used in this table were customized based on the establishment-level data. They offer more detail than the previous aggregate subregional data shown in this report. (c) There was no venture capital investment in Eastern Contra Costa in 2020.

Source: Pitchbook, 2021; Strategic Economics, 2021.

FIGURE 36

Venture Capital Investment by Category & Subarea, 2020

