

# Richmond Green-Blue New Deal Workforce Development Plan

## Community Profile & Economic Development Insights

January 2023



**Appraccel**  
Appreciative Acceleration

HR&A



CITY OF  
*Richmond* CALIFORNIA

# Table of Contents

---

## **0 Executive Summary and Analysis Highlights / 3**

## **1 Introduction / 29**

## **2 Findings / 36**

Richmond's Overall Economy / 37

Richmond's Green Jobs Today / 52

Richmond's Green Jobs Wages / 66

Richmond's Green Job Demographics / 71

Richmond's Green Job Trends / 83

Richmond's Municipal Budget / 88

## **3 Additional Methodological Notes / 99**

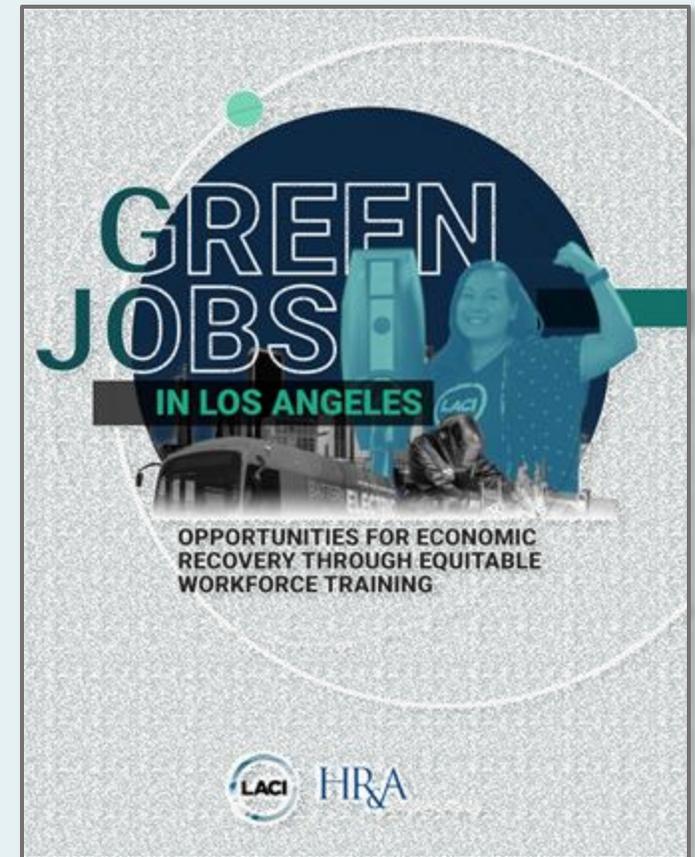


00

# EXECUTIVE SUMMARY & ANALYSIS HIGHLIGHTS

## EXECUTIVE SUMMARY | ABOUT HR&A

HR&A Advisors is a national consulting firm providing services in inclusive growth, urban tech and innovation, program design and implementation, and place-based initiatives.



HR&A is supporting the Appraccel team by profiling Richmond's green-blue economy.

The Community Profile addresses the following key questions:

- 1 Which of Richmond's economic strengths are most relevant to the creation of Green Jobs?
- 2 How many Green Jobs are in Richmond today?
- 3 Which occupations and industries in Richmond have the most Green Jobs?
- 4 What are the demographics and wages of workers in Richmond Green Jobs?
- 5 How does Richmond's green economy compare to that of the county and metro area?

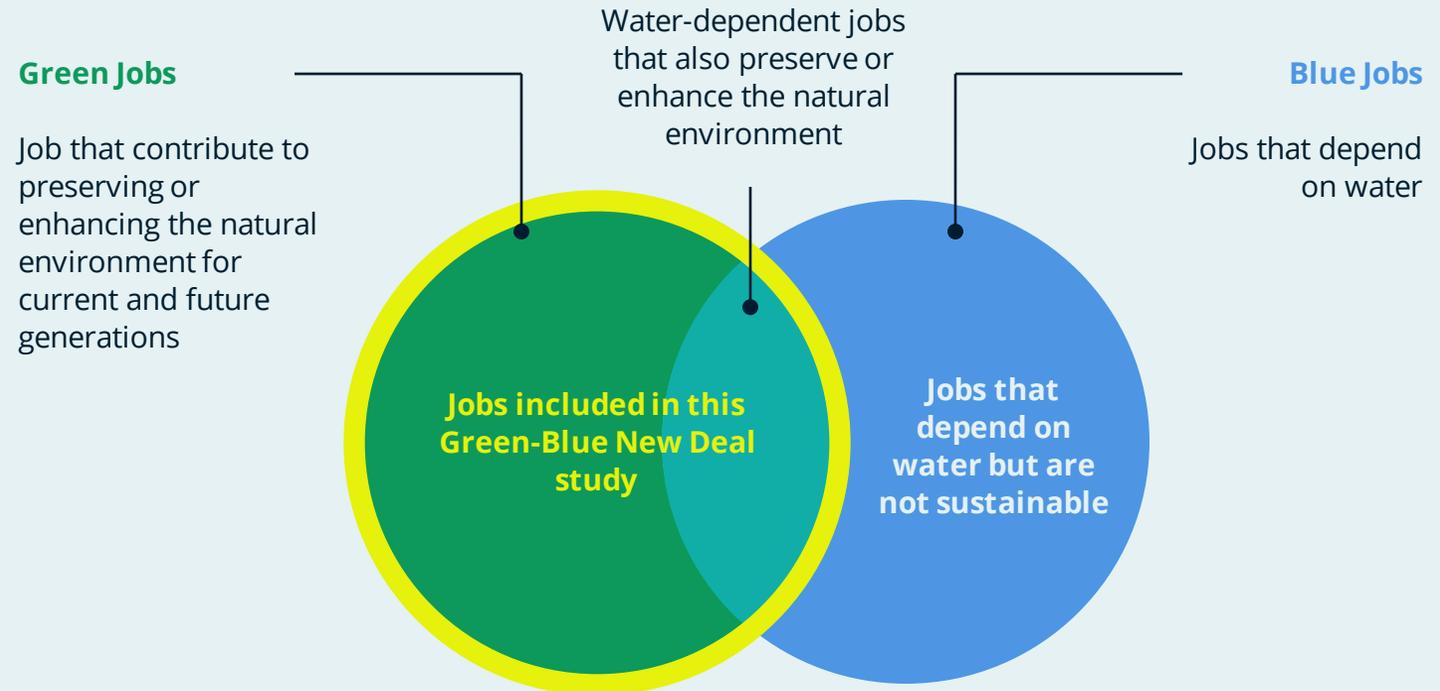
## EXECUTIVE SUMMARY | GREEN-BLUE JOB DEFINITION

A green job is one that contributes to preserving or enhancing the natural environment for current and future generations.

Definitions of Green Jobs vary across institutions, but all share a focus on environmental sustainability. This study includes all Green Jobs, with a special focus on the subset that is water-dependent or “green-blue”.

Definitions can help direct analysis. For this study, the consulting team chose a definition that has supporting data (e.g., industry-level job data) in order to most closely align the quantification with the definition.

Community resilience includes a much wider group of jobs related to creating resilient systems that can bounce back more easily from shocks like wildfires, earthquakes, and storm surges, and allow the local community to support itself in the event it is cut off from global supply chains include installing solar emergency microgrids and natural levees, creating local food systems and worker-owned cooperatives. While those jobs are not quantified in this study due to data limitations, it's important to recognize that a resilient Richmond will require investment in these jobs as well.



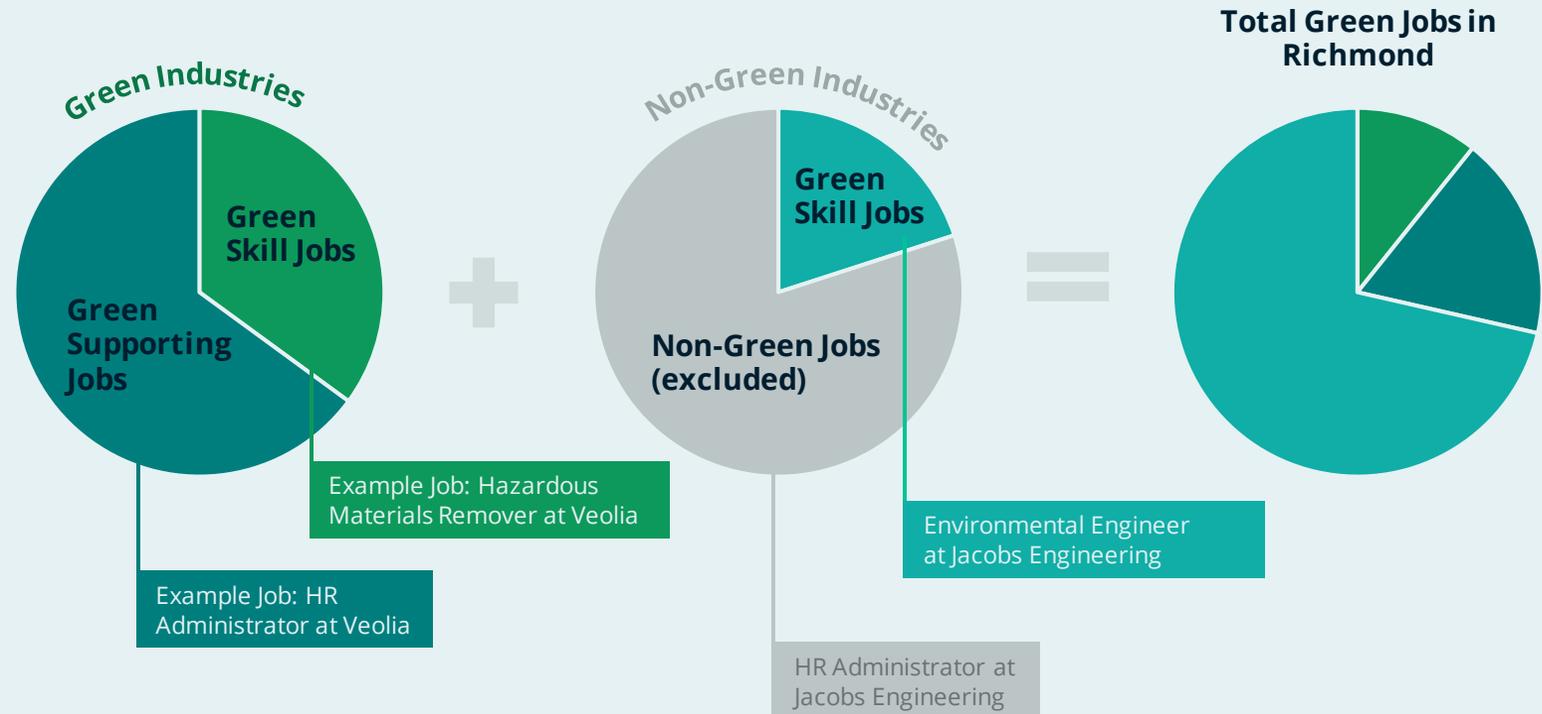
## EXECUTIVE SUMMARY | GREEN-BLUE JOB DEFINITION

As part of a workforce development plan, this Community Profile focuses on jobs that require Green Skills and other jobs that support Green Industries.

This study conservatively quantifies Green Jobs using a skills-based methodology, thus defining “Green Jobs” as those that explicitly use Green Skills and/or support green industries. **Green Jobs** contribute to preserving or enhancing the natural environment for current and future generations.

This study identifies two types of Green Jobs. **Green Skill Jobs** require specific skills related to preserving or enhancing the natural environment. **Green Supporting Jobs** do not require Green Skills but are in an industry whose activities preserve or enhance the natural environment.

**Green-Blue Jobs**, occasionally called out in the dataset, are Green Jobs that are water-dependent. These jobs are already quantified within Green Skill Jobs and Green Supporting Jobs, but are highlighted separately due to Richmond’s coastal proximity and port economy.



## EXECUTIVE SUMMARY | Occupation Categories

To assess the differences between types of jobs, this study further divides jobs into four occupational categories.

### TECHNICAL SERVICES

Require a high level of technical training and skill.

**SOC Categories:**

- 15: Computer and Mathematical Occupations
- 17: Architecture and Engineering Occupations
- 19: Life, Physical, and Social Science Occupations
- 23: Legal Occupations

**Examples:** Computer technology professionals, software engineers, architects, engineers, environmental lawyers, environmental scientists.

### OFFICE MANAGEMENT & OPERATIONS

Support day-to-day operations of green businesses and promote green products and services.

**SOC Categories:**

- 11: Management Occupations
- 13: Business and Financial Operations Occupations
- 41: Sales and Related Occupations
- 43: Office and Administrative Support Occupations

**Examples:** Outreach directors, office administrators, business directors, sustainability officers, managers, sales associates.

### PRODUCTION, CONSTRUCTION, & TRANSPORTATION

Produce or repair green products, construct green buildings and infrastructure, or transport green products.

**SOC Categories:**

- 47: Construction and Extraction Occupations
- 49: Installation, Maintenance, and Repair Occupations
- 51: Production Occupations
- 53: Transportation and Material Moving Occupations

**Examples:** Construction workers, mechanics, drivers, contractors, electricians, maintenance workers.

### OTHER SERVICES & PROFESSIONS

Green jobs that do not fit into the previous three categories, including healthcare, education, arts, food preparation, and compliance occupations.

**SOC Categories:**

- All others

**Examples:** Film makers, travel guides, librarians, graphic designers, community organizers, garden managers, .

## Key Takeaways

- 1 Richmond has approximately 51,000 total jobs.
- 2 Richmond's key sectoral strengths relate to utilities, water transportation, building construction, machinery repair/maintenance industries, and research & development. These key industries point toward opportunities for the creation of high-road Green Jobs.
- 3 There are over 2,300 Green Jobs in Richmond, meaning almost one in every 20 jobs requires Green Skills, is in a Green Industry, or both.
- 4 Green Jobs make up a greater share of jobs in Richmond than in the County and the San Francisco MSA. However, between 2010-2019, Green Job growth in Richmond lagged overall job growth, while in the County and the MSA, Green Jobs grew at par with overall jobs.

## Key Takeaways

- 1 40% of Green Jobs are in Production, Construction, and Transportation occupations, which typically do not require a college degree, but also tend to pay less than the average job.
- 2 Three percent of all Green Jobs in Richmond are readily identifiable as “Green-Blue Jobs” as they require Green Skills and are in water-dependent occupations.
- 3 Green Skills related to environmental health/safety, environmental science, and environmental regulations are commonly sought by employers in Richmond.
- 4 Many Green Jobs demand common non-Green Skills such as communication and management, meaning many workers are already partially qualified to work in Green Jobs.
- 5 Veolia, Republic Services, Schnitzer Steel, Cascade Environmental, and ICF International are actively hiring for the greatest number of positions that require Green Skills.

## Key Takeaways

- 1 The average Green Job in Richmond pays \$36 per hour, 24% higher than the average local job.
- 2 Green Jobs that require Green Skills tend to pay 41% more than Supporting Green Jobs, which are jobs in Green Industries that don't require Green Skills.
- 3 For jobs that don't require a college degree, Green Jobs pay a 17% premium (\$4 more per hour).
- 4 Green jobs that require a college degree pay on average 85% more than those that don't—a lower education premium for Green Jobs than for jobs overall.

## Key Takeaways

- 1 The racial and ethnic breakdown of Green Jobs is similar to that of the overall worker population in Contra Costa County.
- 2 Green industries tend to be more diverse than non-green industries, with significantly higher representation of Black and Hispanic workers, though slightly lower Asian representation.
- 3 Although wages in Green Jobs rose faster for non-white workers from 2010 to 2021 than for white workers, Black and Hispanic workers still earn \$14,100 less per year than white workers.
- 4 Half of Richmond's workforce is female, but women hold less than one-third of its Green Jobs.
- 5 Among Green Jobs, there is a \$4,000 pay gap between men and women, though it was almost 1.5 times as large in 2010.

### Economic Development Insights

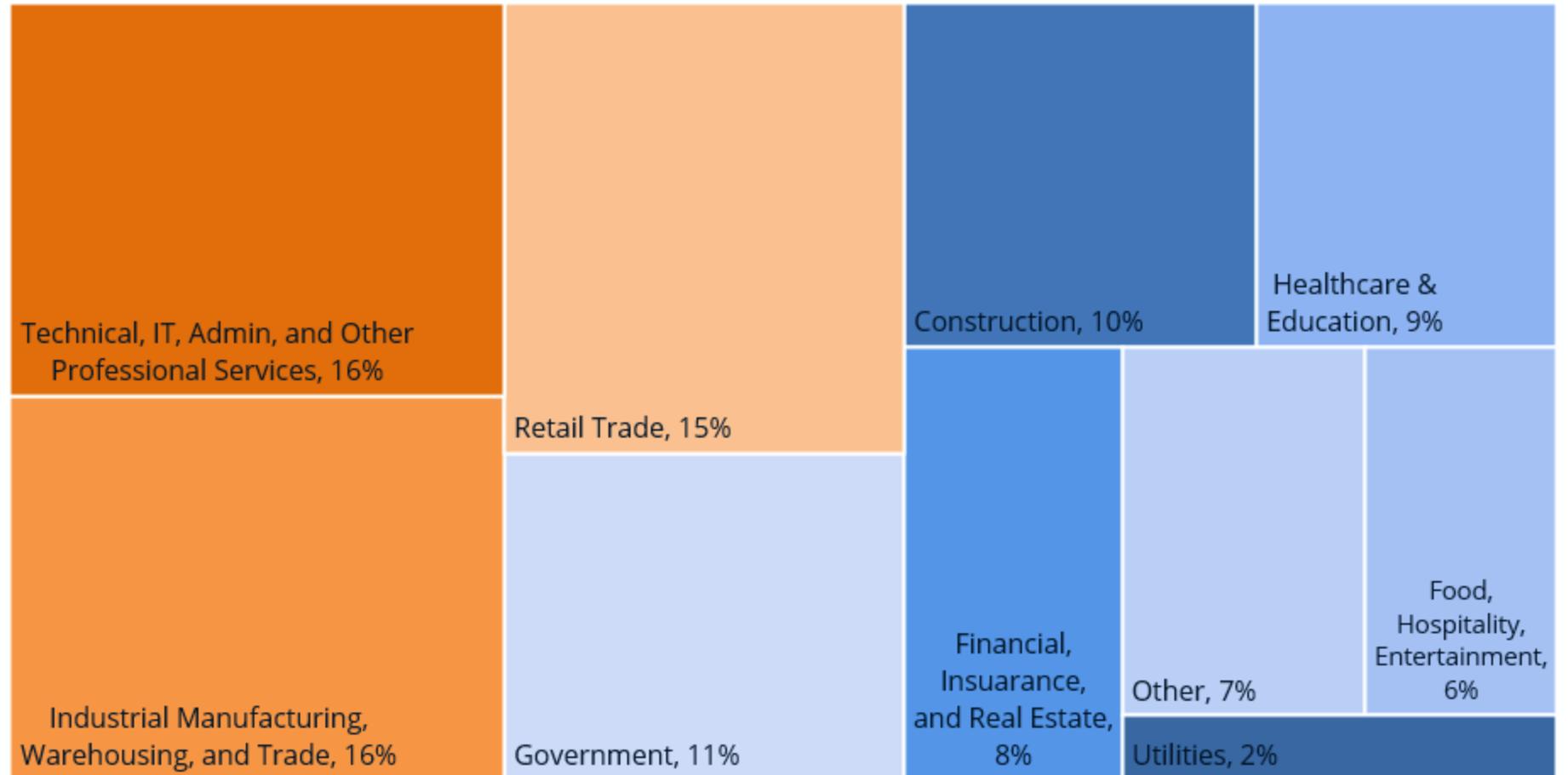
- 1 Richmond's key sectoral strengths relate to **utilities, water transportation, building construction, machinery repair/maintenance, and research & development**. These key industries point toward opportunities for the creation of high-road Green Jobs.
- 2 Existing sectoral strengths reflect Richmond's locational and physical assets, such as its **waterfront, its port, its stock of industrial buildings, and its proximity to Bay Area innovation clusters**. The City can leverage and reinforce each existing asset.
- 3 The City of Richmond has **planned significant infrastructure investments** for the next five years, many of which support environmental resilience and create Green Jobs in both construction and operation of those projects, for example, improving the efficiency of city-owned buildings and electrifying the port.
- 4 Even more impactful than directly supporting Green Jobs (e.g., by retrofitting its own buildings) the City will have opportunities to **catalyze green private investment and job growth** (e.g., by improving port facilities and supporting business incubation).
- 5 Without concerted effort, Richmond risks **falling further behind regional peers** with respect to Green Job growth.
- 6 Targeted **workforce development and job placement efforts**—including coordination with prospective employers—is needed so that Green Job opportunities are available to Richmond residents of all backgrounds and so that the **injustices of past waves of economic growth are not repeated**.

# ANALYSIS HIGHLIGHTS

## ANALYSIS HIGHLIGHTS | ECONOMY OVERVIEW

Almost one-half of Richmond's workforce is employed in one of its top three sectors: professional services, industrial trades, and retail.

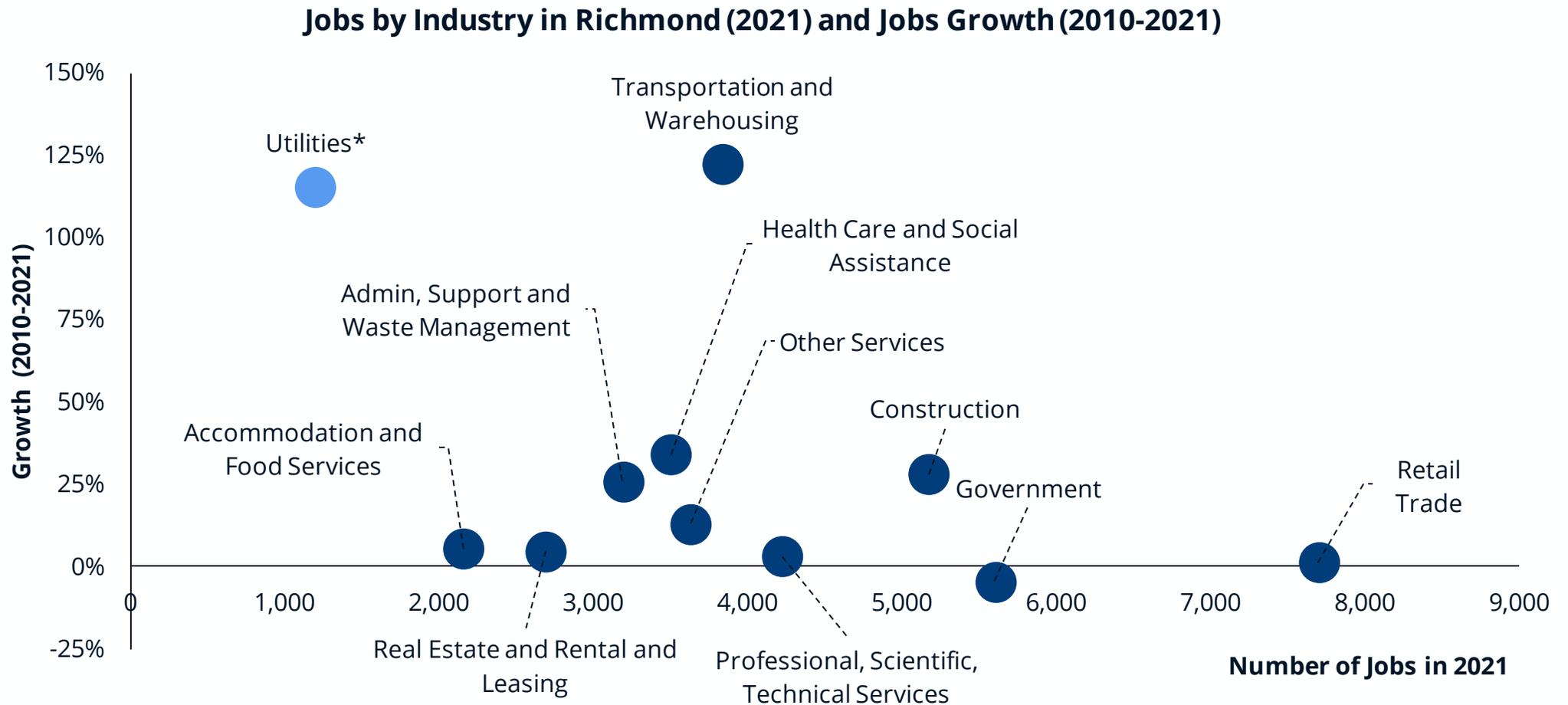
**51,400 Jobs**  
*total jobs in Richmond (2021)*



Source: HR&A's analysis of Lightcast data of 21 2-digit NAICS industries, grouped into sectors.

## ANALYSIS HIGHLIGHTS | INDUSTRY STRENGTHS

After Retail Trade, the largest industries in Richmond by employment are Government and Construction. Transportation & Warehousing and Utilities are the fastest growing industries.



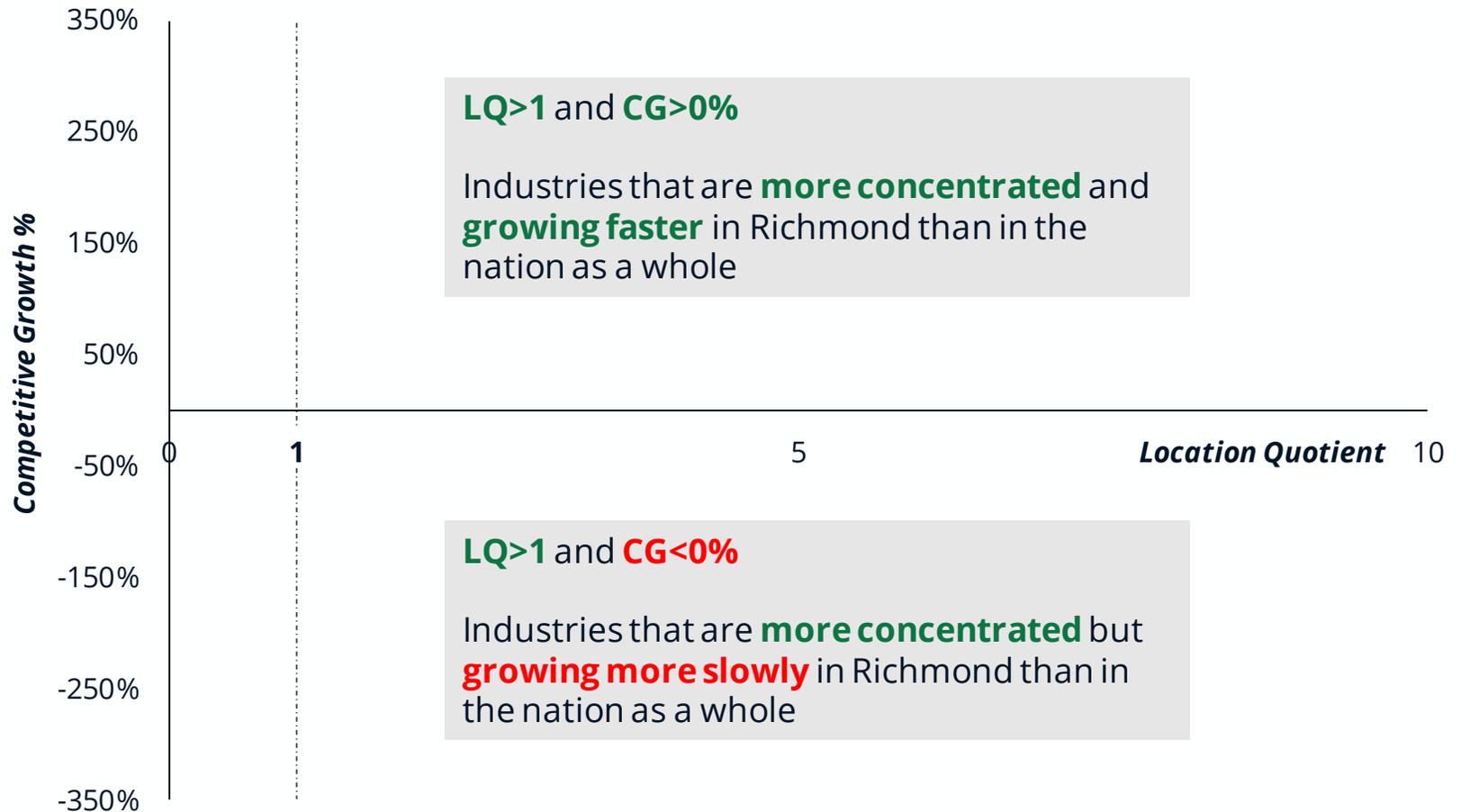
Source: HR&A's analysis of Lightcast data, top 10 by number of jobs out of 21 2-digit NAICS industries. \*Not in top 10 but added for relevance.

## ANALYSIS HIGHLIGHTS | INDUSTRY STRENGTHS

Location quotient and competitiveness effect are two metrics that highlight strengths by comparing local economic performance to national performance within specific industries.

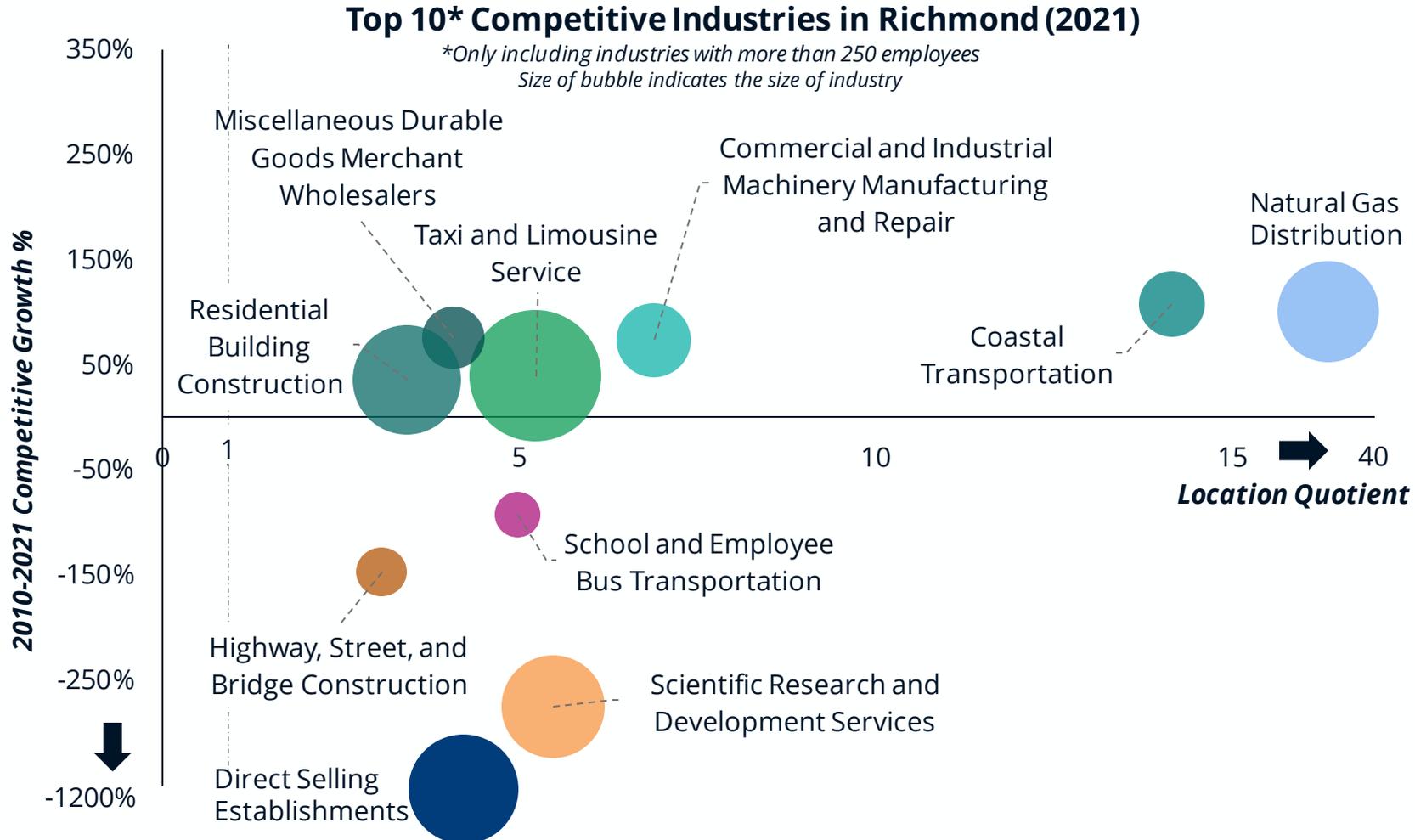
**Location quotient (LQ)** quantifies how concentrated a particular industry is in a region as compared to the nation. An LQ of 1 means the region and the nation have the same composition of a particular industry, an LQ greater than 1 means that the particular industry is more concentrated in the region than the nation, and an LQ less than one means that the particular industry is less concentrated in the region than the nation. For example, a LQ of 3 for an industry means that that industry makes up a 3 times greater share of employment the region of study than in the nation overall.

The regional **competitiveness effect** explains how much of the change in a given industry is due to some unique competitive advantage that the region possesses. This effect is calculated by taking the total regional growth and subtracting the national growth for the same industry. The regional growth that remains cannot be explained by national trends in that industry or the economy as a whole. For example, a competitiveness effect of 200% for an industry means that the industry grew at double the rate within the region than in the nation as a whole.



## ANALYSIS HIGHLIGHTS | INDUSTRY STRENGTHS

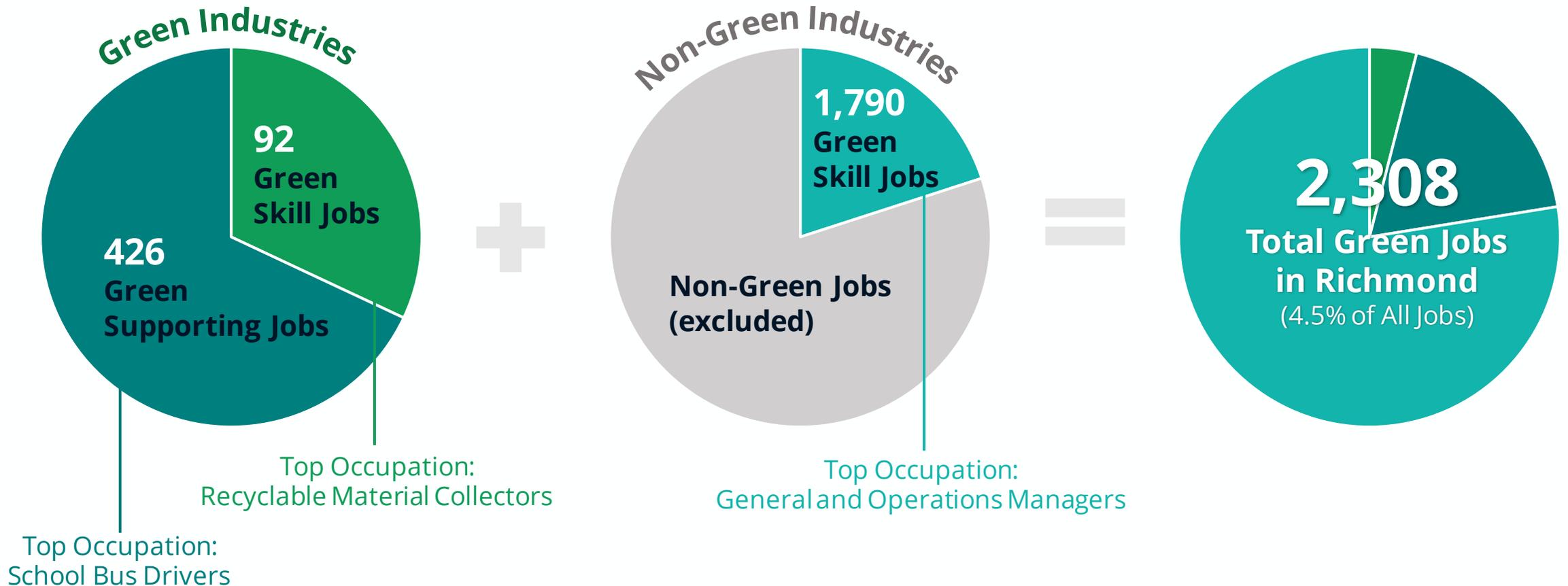
Natural Gas Distribution, Water Transportation, and Scientific R&D have high LQs and large workforces in Richmond.



Source: HR&A's analysis of Lightcast data, out of 301 4-digit NAICS industries.

## ANALYSIS HIGHLIGHTS | GREEN JOB TOTALS

Today, Richmond's economy includes approximately 2,308 Green Jobs across both green (22%) and non-green (78%) industries. Further, 82% Green Jobs require specialized Green Skills, while the other 18% are supporting jobs in green industries.



Source: HR&A's analysis of Lightcast data. Diagram not to scale.

## ANALYSIS HIGHLIGHTS | INDUSTRY STRENGTHS

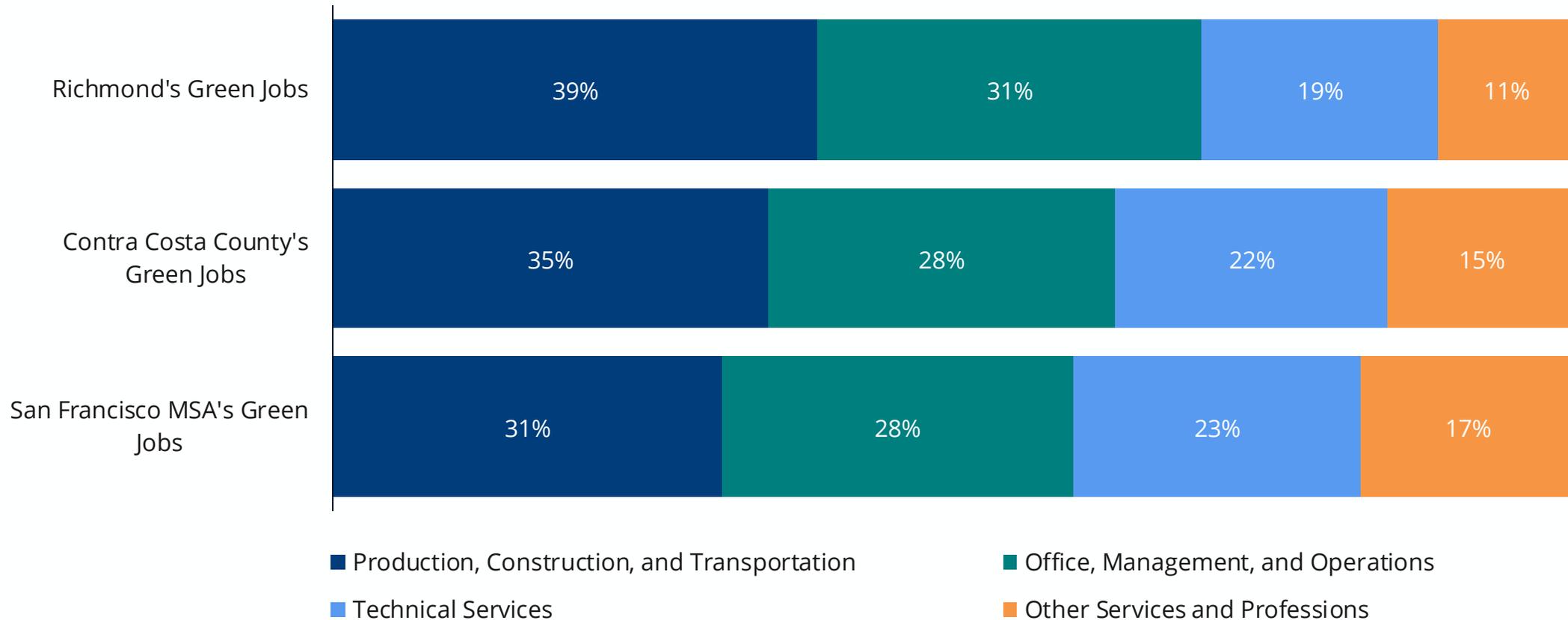
Several of Richmond's key industries are critical to the green economy.

Industry	Key Stats (2010-2021)	Implications for Green Jobs
<b>Utilities</b> (2-digit NAICS)	<b>2021 Jobs: 1,178</b> Growth: 117% LQ: 8.72 Comp: 100%	Richmond's current strength in the oil and natural gas industries will become a liability as fossil fuels are phased out. Richmond workers' skills can be redirected and supplemented to support clean energy development and operation.
<b>Water Transportation</b> (3-digit NAICS)	<b>2021 Jobs: 374</b> Growth: 45% LQ: 24.39 Comp: 112%	Water transportation tends to have a relatively low carbon footprint, so climate action may entail growth in this sector. The electrification of freight and passenger vessels and drayage trucks, and the development of infrastructure to support electric vessels, are still emerging fields.
<b>Commercial/Industrial Machinery Manufacturing &amp; Repair</b> (4-digit NAICS)	<b>2021 Jobs: 674</b> Growth: 27% LQ: 6.90 Comp: 73%	Extending the life of existing equipment through maintenance, repair, and refurbishment is critical for minimizing waste. Decarbonization will also entail the creation of new commercial and industrial machinery.
<b>Building Construction &amp; Services</b> (3-digit NAICS)	<b>2021 Jobs: 1,843</b> Growth: 45% LQ: 3.34 Comp: 37%	Electrification and energy efficiency retrofits are labor-intensive investments that will require skilled workers throughout the region to construct and service. This is a major employment industry in Richmond that can be leveraged.
<b>Research &amp; Development</b> (4-digit NAICS)	<b>2021 Jobs: 1,155</b> Growth: -24% LQ: 5.58 Comp: -231%	Greening the economy requires innovation; although Richmond currently has a relatively high concentration of R&D jobs, its growth in this area has lagged behind the national average.

## ANALYSIS HIGHLIGHTS | OCCUPATION CATEGORIES

In Richmond, 39% of Green Jobs are in Production, Construction, and Transportation occupations, whereas in surrounding areas, Green Jobs are more evenly divided between occupation categories.

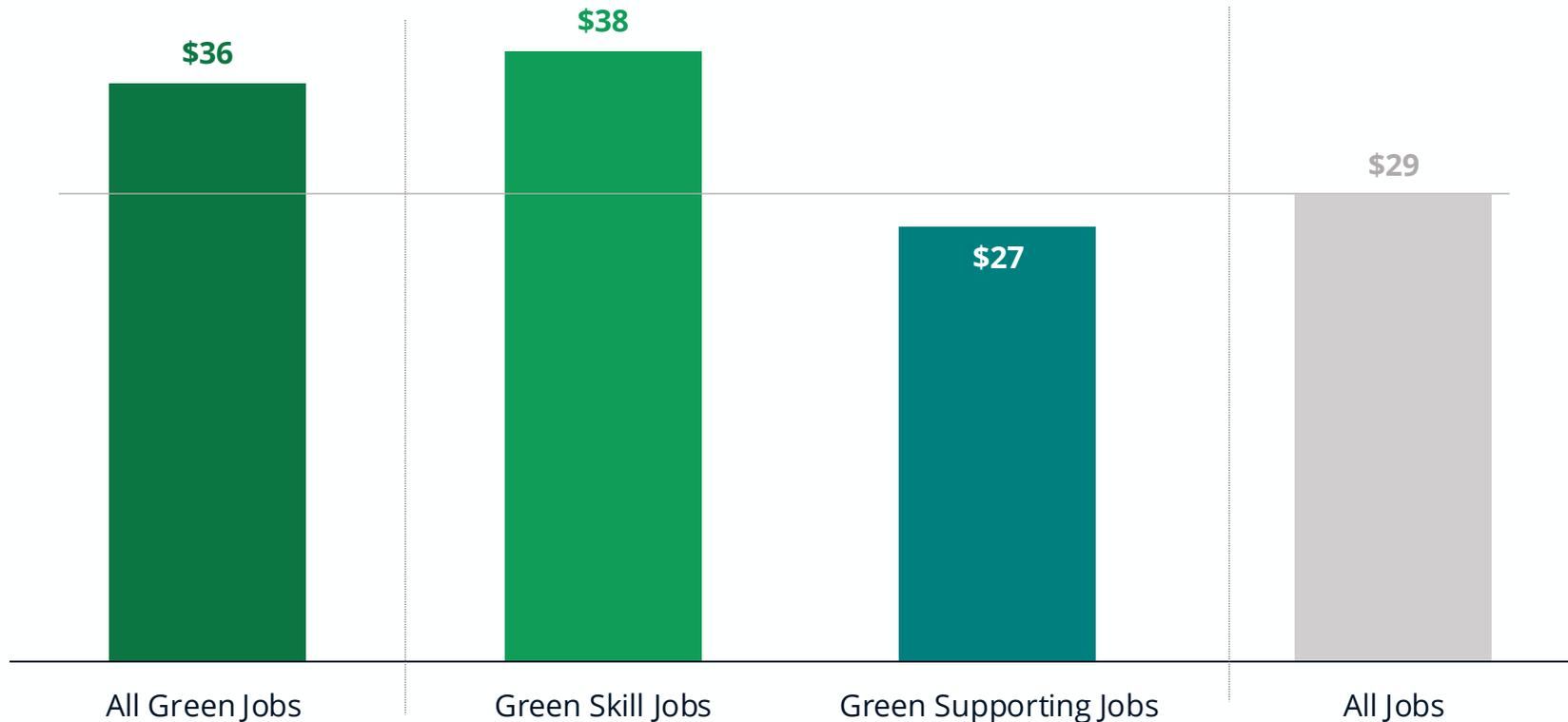
Green Jobs by Occupation Group, by Region (2021)



## ANALYSIS HIGHLIGHTS | WAGES

Overall, Green Job workers earn 24% higher wages compared to the average Richmond worker. Within Green Jobs, Green Skill Jobs pay a 31% premium, while wages in Green Supporting Jobs are slightly lower than the overall economy.

Median Hourly Wage of Green Jobs by category in Richmond (2021)

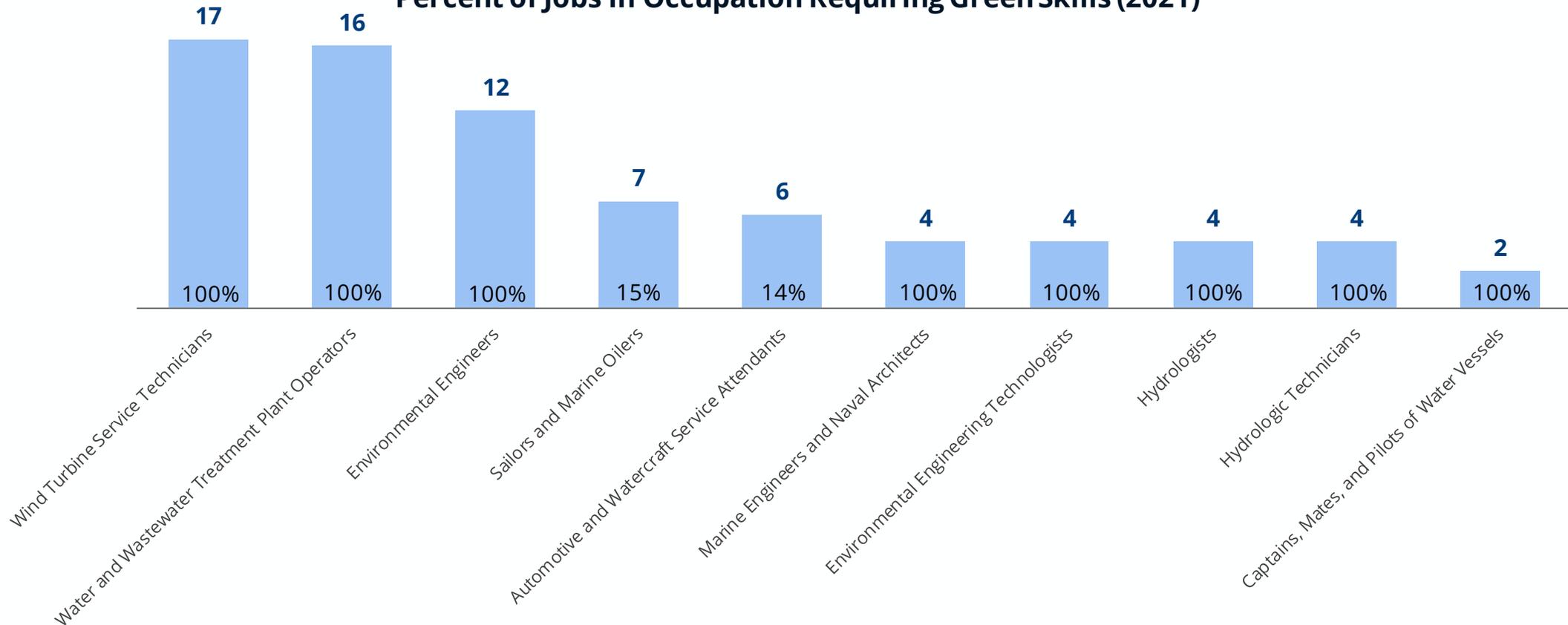


Source: HR&A's analysis of Lightcast data.

## ANALYSIS HIGHLIGHTS | GREEN-BLUE OCCUPATIONS

There are 77 jobs in Richmond readily identifiable as being in “Green-Blue Jobs”, comprising 3% of all Green Jobs. These jobs require Green Skills and are in occupations that are significantly involved in the blue economy.

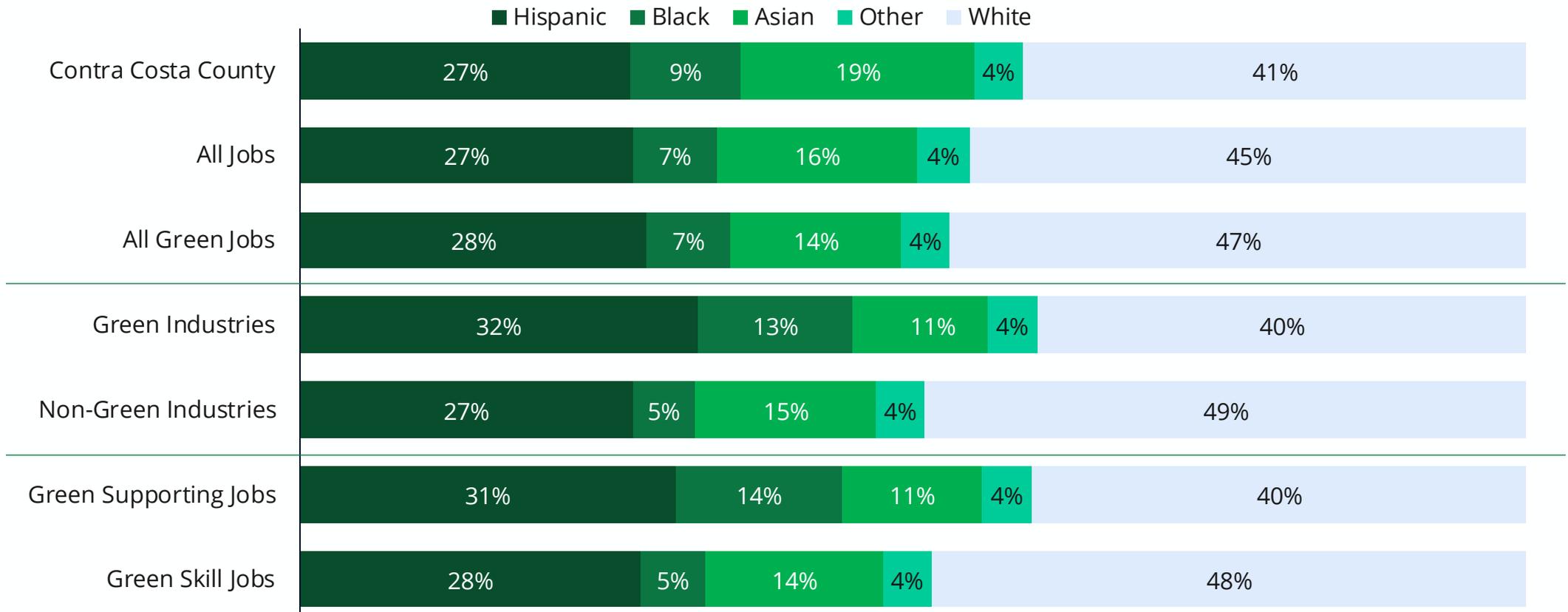
**Richmond’s Green-Blue Jobs by Occupation and Percent of Jobs in Occupation Requiring Green Skills (2021)**



## ANALYSIS HIGHLIGHTS | RACE & ETHNICITY

Green Jobs are racially representative of Contra Costa County's overall economy but not of its population. Among Green Jobs, Green Supporting Jobs are more diverse than Green Skill Jobs. Similarly, green industries are more diverse than non-green industries.

**Racial Representation, by Category (2021)**



Source: HR&A's analysis of Lightcast data. Demographic data for jobs is not available for Richmond so all job demographics are based on Richmond job data and Contra Costa county demographic data.

## ANALYSIS HIGHLIGHTS | TOP-HIRING EMPLOYERS

Veolia, Republic Services, Schnitzer Steel, Cascade Environmental, and ICF International are actively hiring the greatest number of Green Skill Jobs in Richmond.



*Examples: Wastewater Operators, Collections Technicians, Maintenance Technicians*



*Examples: Driller Assistants, Drillers, Field Assistants*



*Examples: Customer Service Advisors, Production Crews, Vehicle Purchasing Agents*



*Examples: Recycling Truck Drivers, Transfer Drivers, Landfill Heavy Equipment Operators*



*Examples: Environmental Chemists, Data Validation Specialists, Chemistry Laboratory Technicians*

## ANALYSIS HIGHLIGHTS | TOP SKILLS

Green Jobs in Richmond most often require Management, Communications, and Operations Skills in addition to Green Skills such as Environmental Health & Safety.

### Top 5 Skills in Jobs Requiring Green Skills

Where size of bubbles represents relative occurrence of these skills.



### Top 5 Green Skills in Green Jobs

Where size of bubbles represents relative occurrence of these skills.

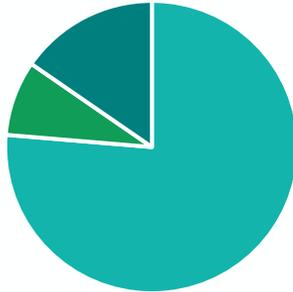


## ANALYSIS HIGHLIGHTS | TOP SKILLS

Many Green Jobs demand common non-Green Skills such as communication and management, meaning many workers are already partially qualified to work in Green Jobs.

### Green Skill Jobs and Supporting Jobs

*in both green and non-green industries*



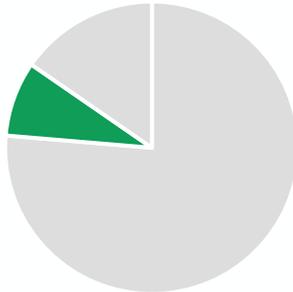
The top skills listed across all Green Job postings include communications, management, and operations. Additional skills include customer service, leadership, writing, and planning. This indicates that many professionals may be able to readily be employed in Green Jobs despite preconceived notions about the prerequisites.



**Sample Green Job Titles Posted in Richmond:** General Managers, Production Supervisors, Research Associates, Project Managers, Maintenance Supervisors

### Green Skill Jobs

*in green industries*



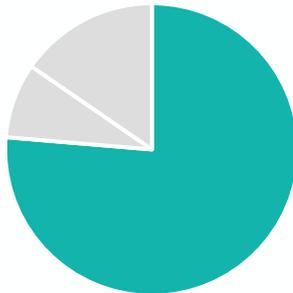
Some Green Skill Jobs call for environmentally-specific skills like data compilation, environmental planning, or wastewater operator certification.



**Sample Green Job Titles Posted in Richmond:** Laboratory Technicians, Chemical Process Operators, Field Assistants, Project Engineers, Environmental Chemists

### Green Skill Jobs

*in non-green industries*



Finally, in non-green industries, many workers may develop Green Skills that they use during some parts of their job. For instance, construction and operations are both frequently listed in green skill job postings – many construction professionals have transferrable skills that can be used in Green Jobs.

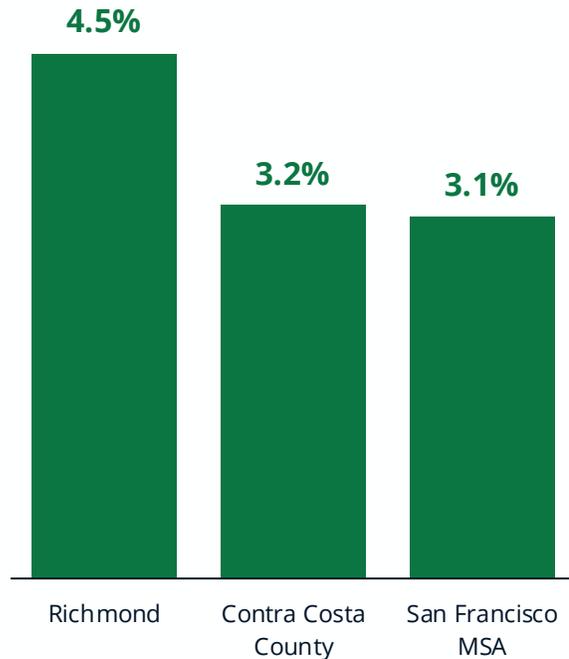


**Sample Green Job Titles Posted in Richmond:** Operator Helpers, Maintenance Technicians, Drillers, Recycling Truck Drivers, Production Crews, Warehouse Receivers, Vehicle Maintenance

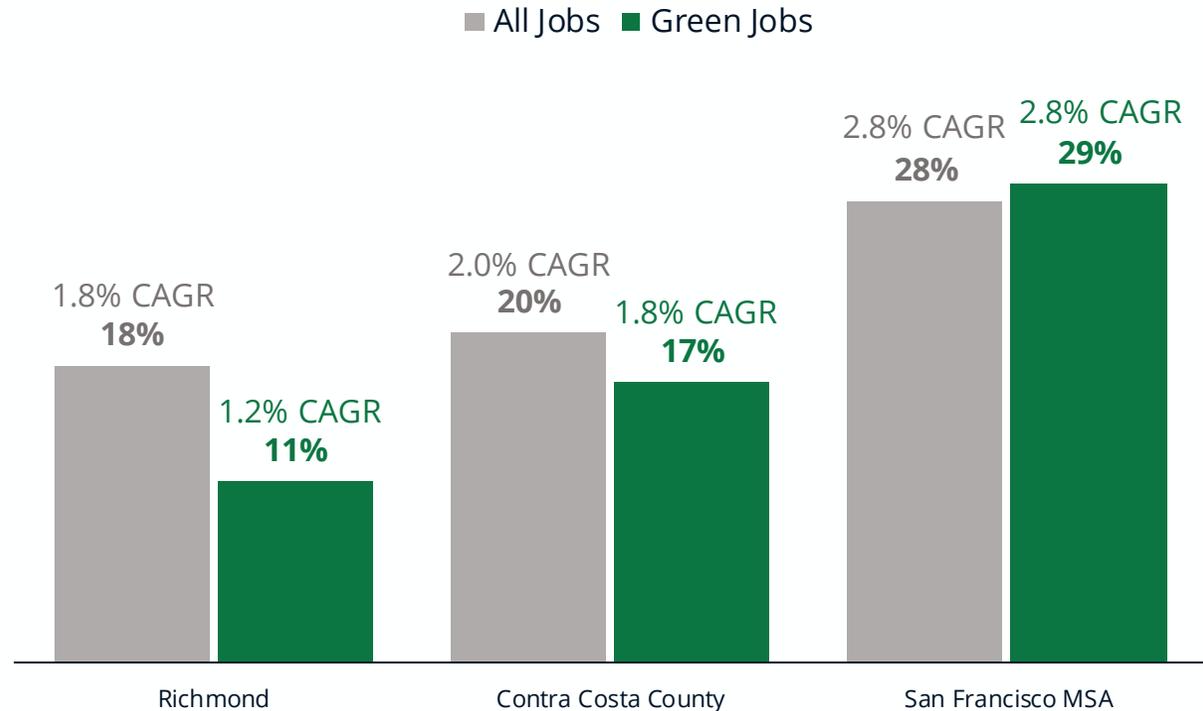
## ANALYSIS HIGHLIGHTS | COMPARATIVE GROWTH TRENDS

Green Jobs make up a greater share of jobs in Richmond than in the County and the MSA. However, between 2010-2019, Green Job growth in Richmond lagged the overall job growth, while in the County and the MSA, Green Jobs grew almost at par with overall jobs.

### Share of Green Jobs in Entire Workforce, by Region (2021)



### Jobs Growth, by Region (2010-2019)



Source: HR&A's analysis of Lightcast data.

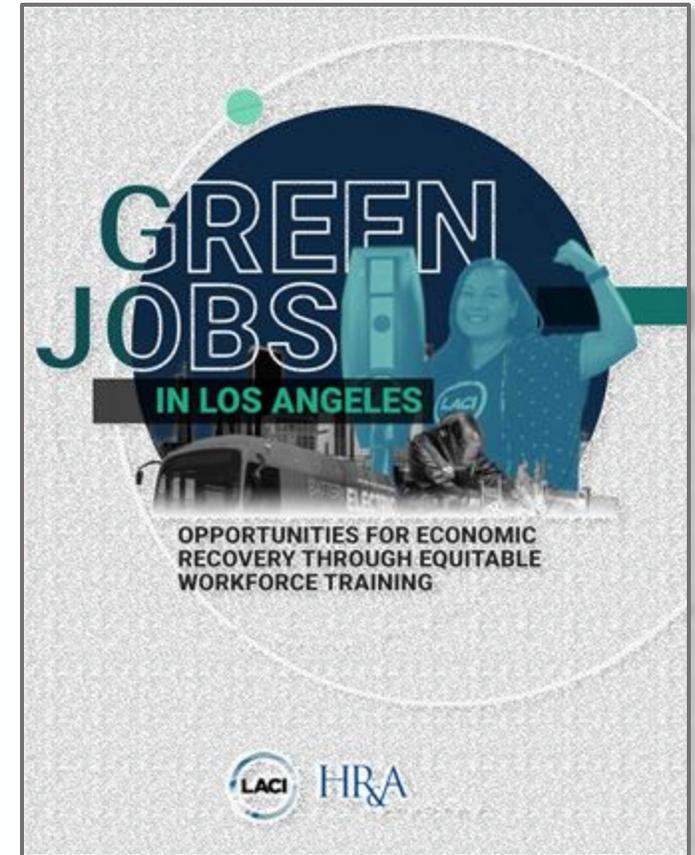


01

# INTRODUCTION

## INTRODUCTION | ABOUT HR&A

HR&A Advisors is a national consulting firm providing services in inclusive growth, urban tech and innovation, program design and implementation, and place-based initiatives.



HR&A is supporting the Appraccel team by profiling Richmond's green-blue economy.

The Community Profile addresses the following key questions:

- 1 Which of Richmond's economic strengths are most relevant to the creation of Green Jobs?
- 2 How many Green Jobs are in Richmond today?
- 3 Which occupations and industries in Richmond have the most Green Jobs?
- 4 What are the demographics and wages of workers in Richmond Green Jobs?
- 5 How does Richmond's green economy compare to that of the county and metro area?

## INTRODUCTION | GREEN-BLUE JOB DEFINITION

A green job is one that contributes to preserving or enhancing the natural environment for current and future generations.

Definitions of Green Jobs vary across institutions, but all share a focus on environmental sustainability. This study includes all Green Jobs, with a special focus on the subset that is water-dependent or “green-blue”.

Definitions can help direct analysis. For this study, the consulting team chose a definition that has supporting data (e.g., industry-level job data) in order to most closely align the quantification with the definition.

Community resilience includes a much wider group of jobs related to creating resilient systems that can bounce back more easily from shocks like wildfires, earthquakes, and storm surges, and allow the local community to support itself in the event it is cut off from global supply chains include installing solar emergency microgrids and natural levees, creating local food systems and worker-owned cooperatives. While those jobs are not quantified in this study due to data limitations, it’s important to recognize that a resilient Richmond will require investment in these jobs as well.

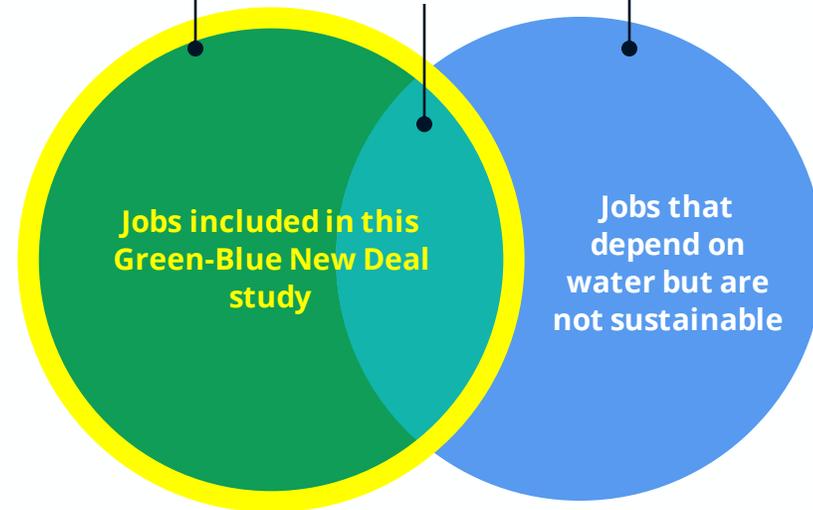
### Green Jobs

Job that contribute to preserving or enhancing the natural environment for current and future generations

Water-dependent jobs that also preserve or enhance the natural environment

### Blue Jobs

Jobs that depend on water



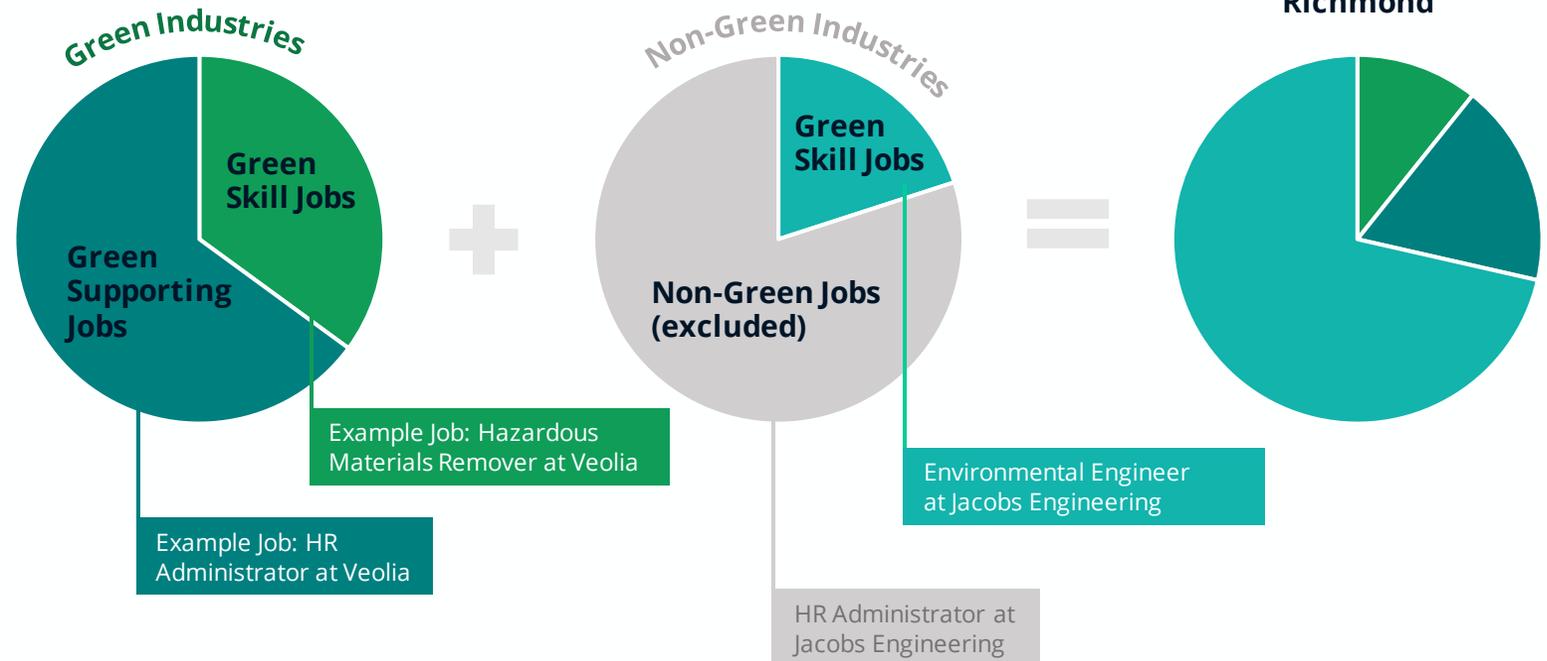
## INTRODUCTION | GREEN-BLUE JOB DEFINITION

As part of a workforce development plan, this Community Profile focuses on jobs that require Green Skills and other jobs that support Green Industries.

This study conservatively quantifies Green Jobs using a skills-based methodology, thus defining “Green Jobs” as those that explicitly use Green Skills and/or support green industries. **Green Jobs** contribute to preserving or enhancing the natural environment for current and future generations.

This study identifies two types of Green Jobs. **Green Skill Jobs** require specific skills related to preserving or enhancing the natural environment. **Green Supporting Jobs** do not require Green Skills but are in an industry whose activities preserve or enhance the natural environment.

**Green-Blue Jobs**, occasionally called out in the dataset, are Green Jobs that are water-dependent. These jobs are already quantified within Green Skill Jobs and Green Supporting Jobs, but are highlighted separately due to Richmond’s coastal proximity and port economy.



## INTRODUCTION

This study uses the best available data on jobs and job postings in Richmond to estimate the number of Green Jobs and characterize worker demographics.

### GREEN SKILL JOBS

1. Using historic job postings on Lightcast<sup>1</sup>, first determine the percentage of jobs in each occupation that require Green Skills.
2. Pro-rate each occupation's share of Green Skill Jobs by applying the green skill requirement percentage to the total number of jobs in that occupation.



### GREEN SUPPORTING JOBS

1. Using Lightcast<sup>1</sup>, calculate total jobs in green industries, based on a national Bureau of Labor Statistics (BLS) survey on the percent of each industry's revenue derived from green activities.
2. Subtract the Green Skill Jobs in green industries previously calculated to estimate the number of jobs that are in green industries but do not require Green Skills.



3. Categorize Green Skill Jobs and Green Supporting Jobs to enable more nuanced analysis along dimensions including skills, occupation groups, major companies, and demographics.



<sup>1</sup>HR&A is relying on Lightcast (formerly EMSI), a third-party labor data aggregation firm, to gather the share of job postings in various industries with green skills as a share of total job postings over the last 3-5 years. Lightcast has a Green Skills category established through benchmarking popular studies on green jobs, which can be modified if needed to suit our definitions.

## INTRODUCTION | Occupation Categories

To assess the differences between types of jobs, this study further divides jobs into four occupational categories.

### TECHNICAL SERVICES

Require a high level of technical training and skill.

**SOC Categories:**

- 15: Computer and Mathematical Occupations
- 17: Architecture and Engineering Occupations
- 19: Life, Physical, and Social Science Occupations
- 23: Legal Occupations

**Examples:** Computer technology professionals, software engineers, architects, engineers, environmental lawyers, environmental scientists.

### OFFICE MANAGEMENT & OPERATIONS

Support day-to-day operations of green businesses and promote green products and services.

**SOC Categories:**

- 11: Management Occupations
- 13: Business and Financial Operations Occupations
- 41: Sales and Related Occupations
- 43: Office and Administrative Support Occupations

**Examples:** Outreach directors, office administrators, business directors, sustainability officers, managers, sales associates.

### PRODUCTION, CONSTRUCTION, & TRANSPORTATION

Produce or repair green products, construct green buildings and infrastructure, or transport green products.

**SOC Categories:**

- 47: Construction and Extraction Occupations
- 49: Installation, Maintenance, and Repair Occupations
- 51: Production Occupations
- 53: Transportation and Material Moving Occupations

**Examples:** Construction workers, mechanics, drivers, contractors, electricians, maintenance workers.

### OTHER SERVICES & PROFESSIONS

Green jobs that do not fit into the previous three categories, including healthcare, education, arts, food preparation, and compliance occupations.

**SOC Categories:**

- All others

**Examples:** Film makers, travel guides, librarians, graphic designers, community organizers, garden managers, .



02

# FINDINGS

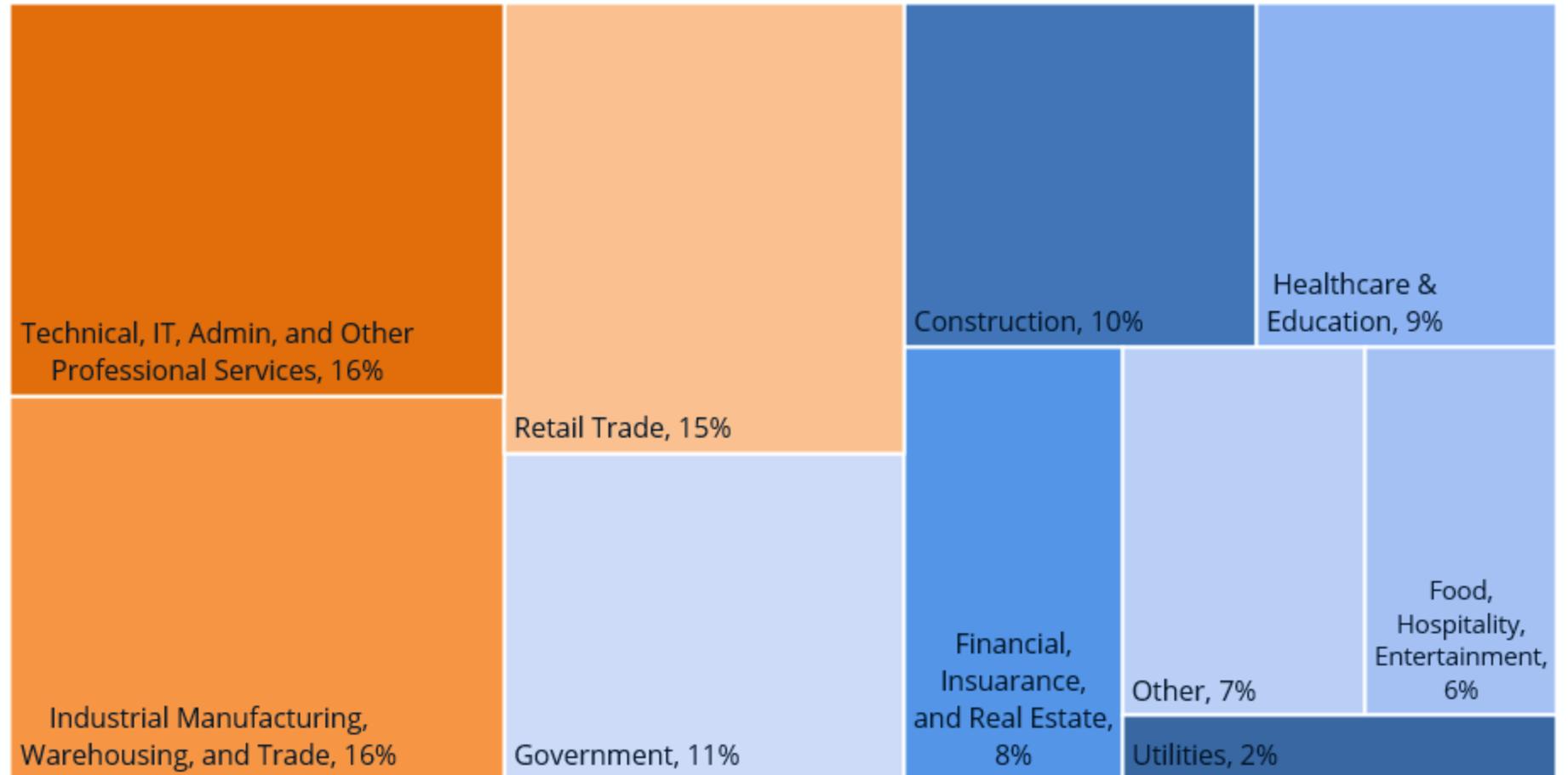
RICHMOND'S

OVERALL ECONOMY

## OVERALL ECONOMY | OVERVIEW

Almost one-half of Richmond's workforce is employed in one of its top three sectors: professional services, industrial trades, and retail.

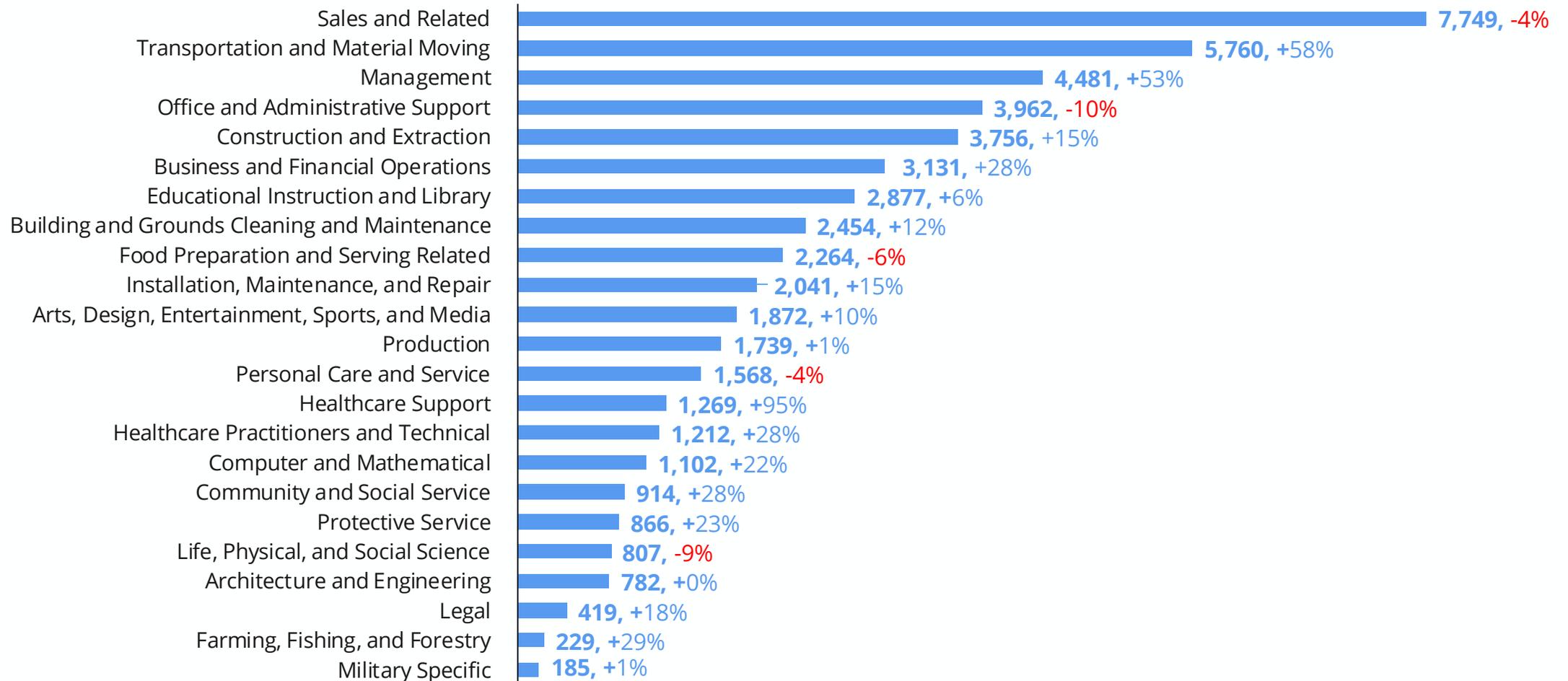
**51,400 Jobs**  
*total jobs in Richmond (2021)*



## OVERALL ECONOMY | OVERVIEW

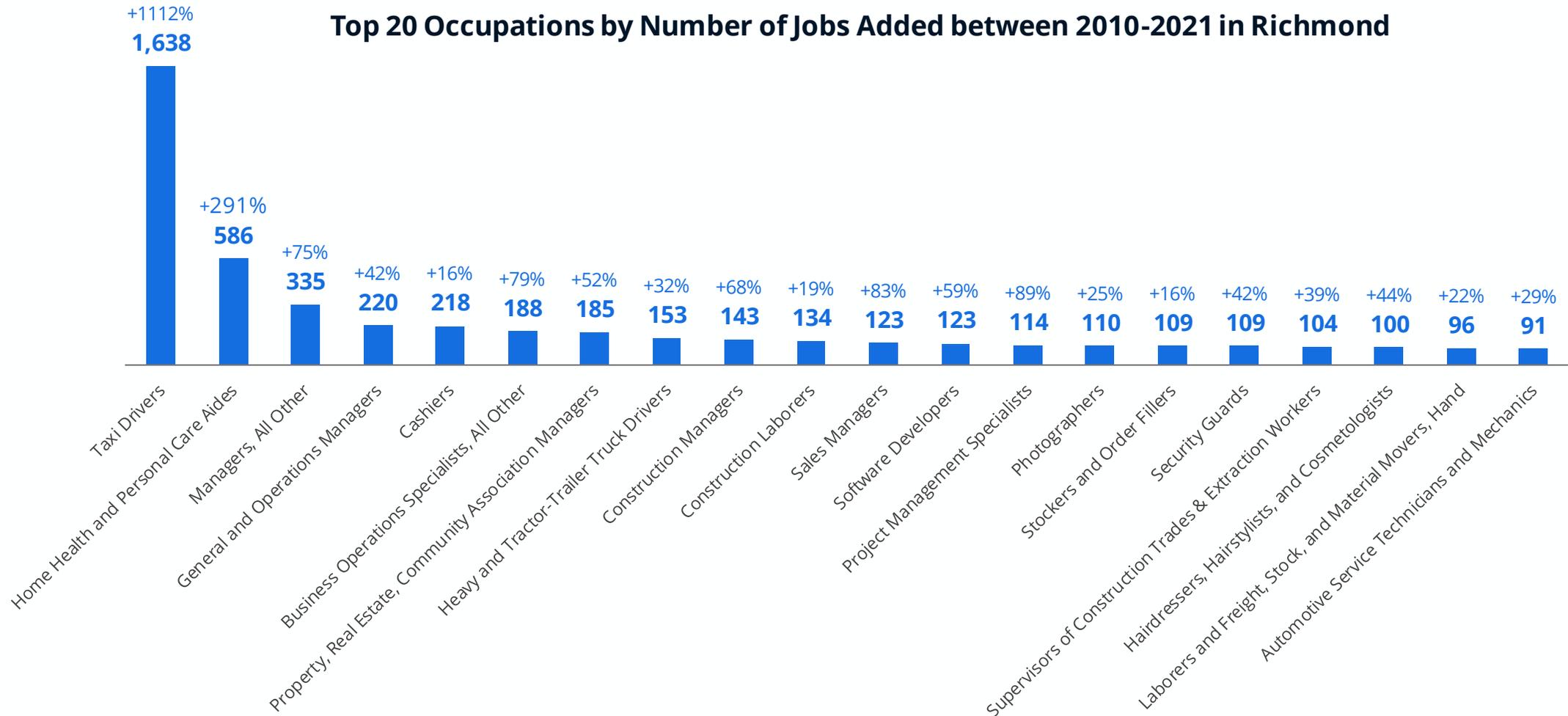
Sales occupations are the largest in Richmond, followed by Transportation & Moving, and Management occupations. Healthcare occupations are the fastest growing in Richmond.

**Jobs by Occupation in Richmond (2021) and Jobs Growth (2010-2021)**



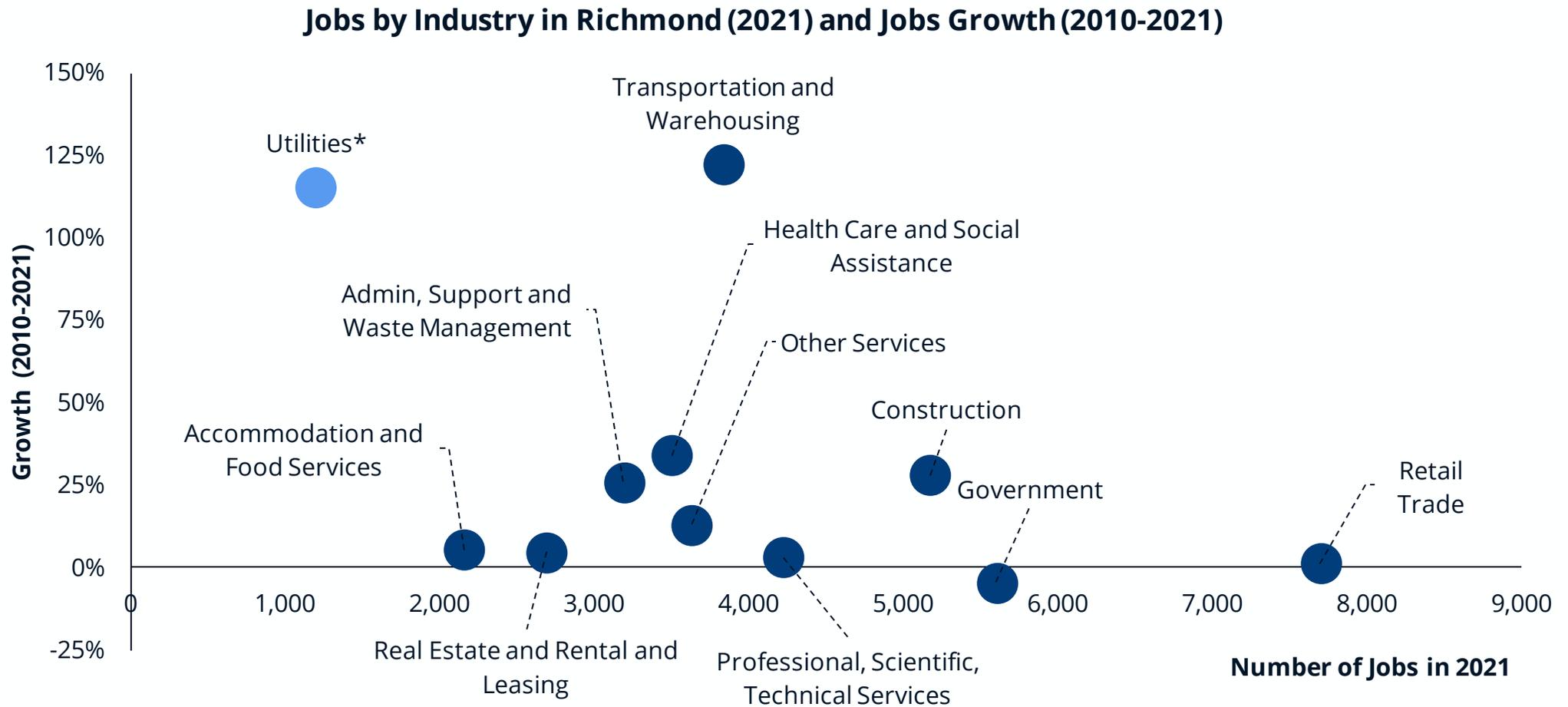
## OVERALL ECONOMY | OVERVIEW

After Taxi Drivers, top growing occupations include Health Care Aides, Managers, Cashiers, and Business Operations Specialists.



## OVERALL ECONOMY | INDUSTRY SIZE & GROWTH

After Retail Trade, the largest industries in Richmond by employment are Government and Construction. Transportation & Warehousing and Utilities are the fastest growing industries.

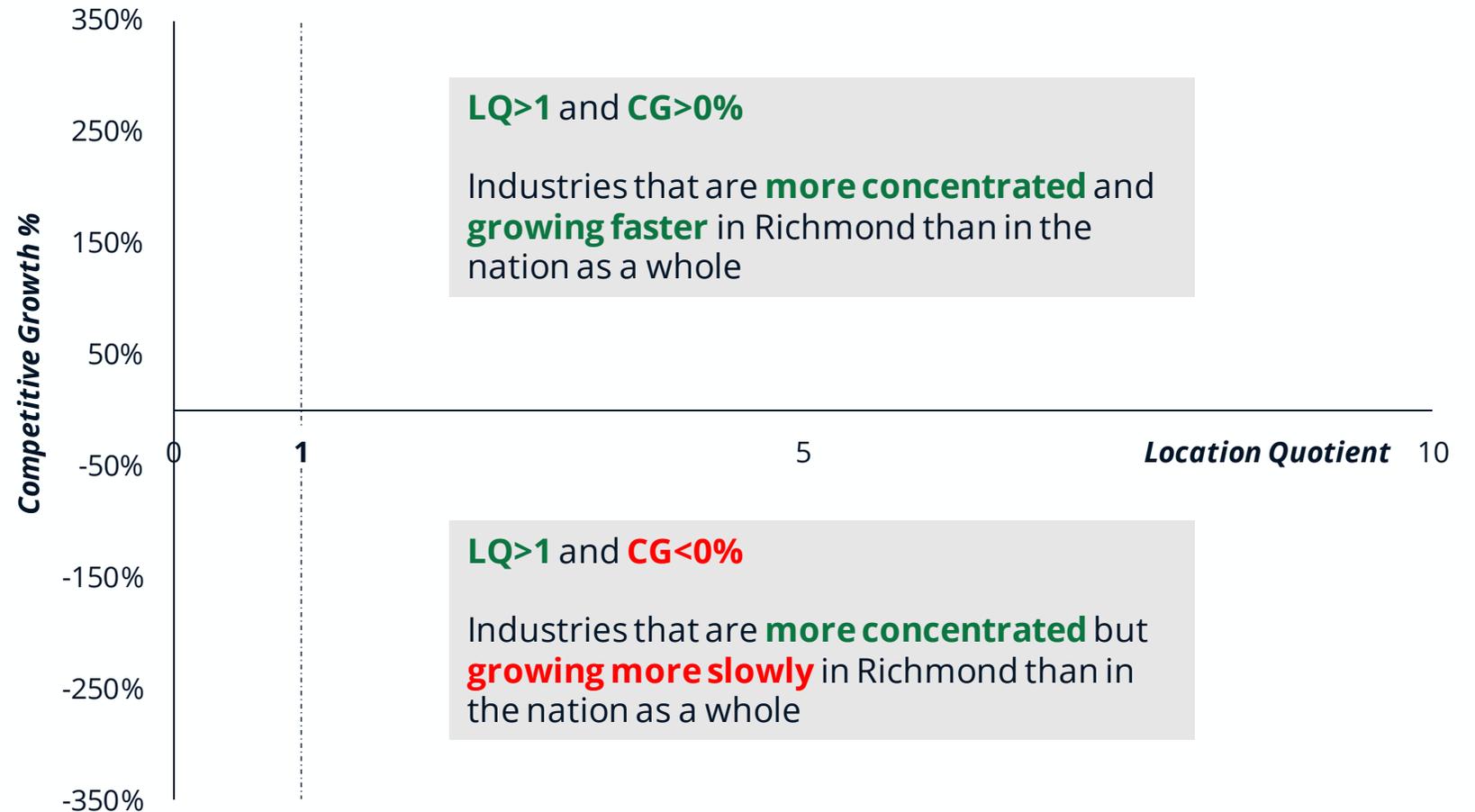


## OVERALL ECONOMY | INDUSTRY STRENGTHS

Location quotient and competitiveness effect are two metrics that highlight strengths by comparing local economic performance to national performance within specific industries.

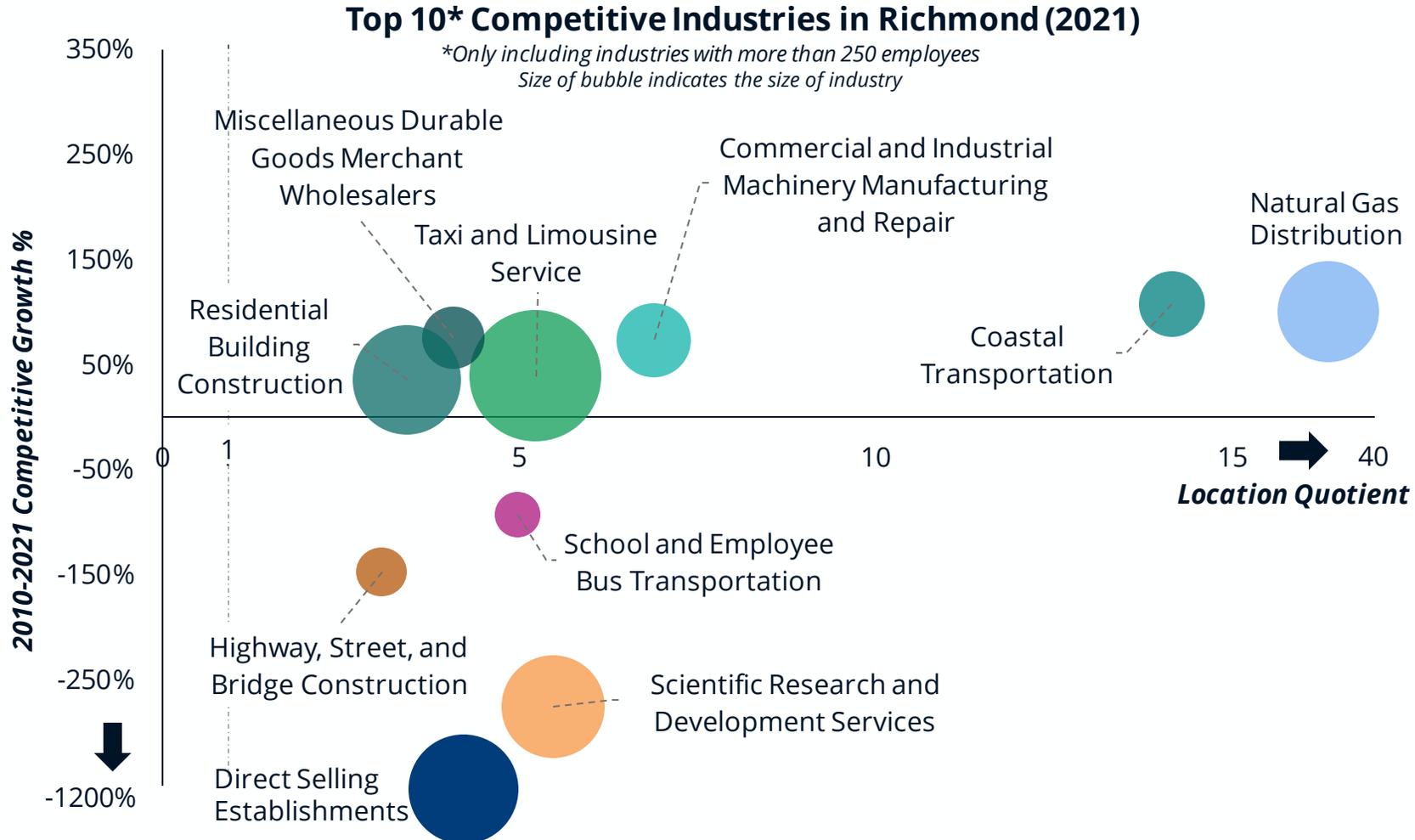
**Location quotient (LQ)** quantifies how concentrated a particular industry is in a region as compared to the nation. An LQ of 1 means the region and the nation have the same composition of a particular industry, an LQ greater than 1 means that the particular industry is more concentrated in the region than the nation, and an LQ less than one means that the particular industry is less concentrated in the region than the nation. For example, a LQ of 3 for an industry means that that industry makes up a 3 times greater share of employment the region of study than in the nation overall.

The regional **competitiveness effect** explains how much of the change in a given industry is due to some unique competitive advantage that the region possesses. This effect is calculated by taking the total regional growth and subtracting the national growth for the same industry. The regional growth that remains cannot be explained by national trends in that industry or the economy as a whole. For example, a competitiveness effect of 200% for an industry means that the industry grew at double the rate within the region than in the nation as a whole.



## OVERALL ECONOMY | INDUSTRY STRENGTHS

Natural Gas Distribution, Water Transportation, and Scientific R&D have high LQs and large workforces in Richmond.



## OVERALL ECONOMY | INDUSTRY STRENGTHS

Several of Richmond's key industries are critical to the green economy.

Industry	Key Stats (2010-2021)	Implications for Green Jobs
<b>Utilities</b> (2-digit NAICS)	<b>2021 Jobs: 1,178</b> Growth: 117% LQ: 8.72 Comp: 100%	Richmond's current strength in the oil and natural gas industries will become a liability as fossil fuels are phased out. Richmond workers' skills can be redirected and supplemented to support clean energy development and operation.
<b>Water Transportation</b> (3-digit NAICS)	<b>2021 Jobs: 374</b> Growth: 45% LQ: 24.39 Comp: 112%	Water transportation tends to have a relatively low carbon footprint, so climate action may entail growth in this sector. The electrification of freight and passenger vessels and drayage trucks, and the development of infrastructure to support electric vessels, are still emerging fields.
<b>Commercial/Industrial Machinery Manufacturing &amp; Repair</b> (4-digit NAICS)	<b>2021 Jobs: 674</b> Growth: 27% LQ: 6.90 Comp: 73%	Extending the life of existing equipment through maintenance, repair, and refurbishment is critical for minimizing waste. Decarbonization will also entail the creation of new commercial and industrial machinery.
<b>Building Construction &amp; Services</b> (3-digit NAICS)	<b>2021 Jobs: 1,843</b> Growth: 45% LQ: 3.34 Comp: 37%	Electrification and energy efficiency retrofits are labor-intensive investments that will require skilled workers throughout the region to construct and service. This is a major employment industry in Richmond that can be leveraged.
<b>Research &amp; Development</b> (4-digit NAICS)	<b>2021 Jobs: 1,155</b> Growth: -24% LQ: 5.58 Comp: -231%	Greening the economy requires innovation; although Richmond currently has a relatively high concentration of R&D jobs, its growth in this area has lagged behind the national average.

## OVERALL ECONOMY | FOSSIL FUEL CLUSTER

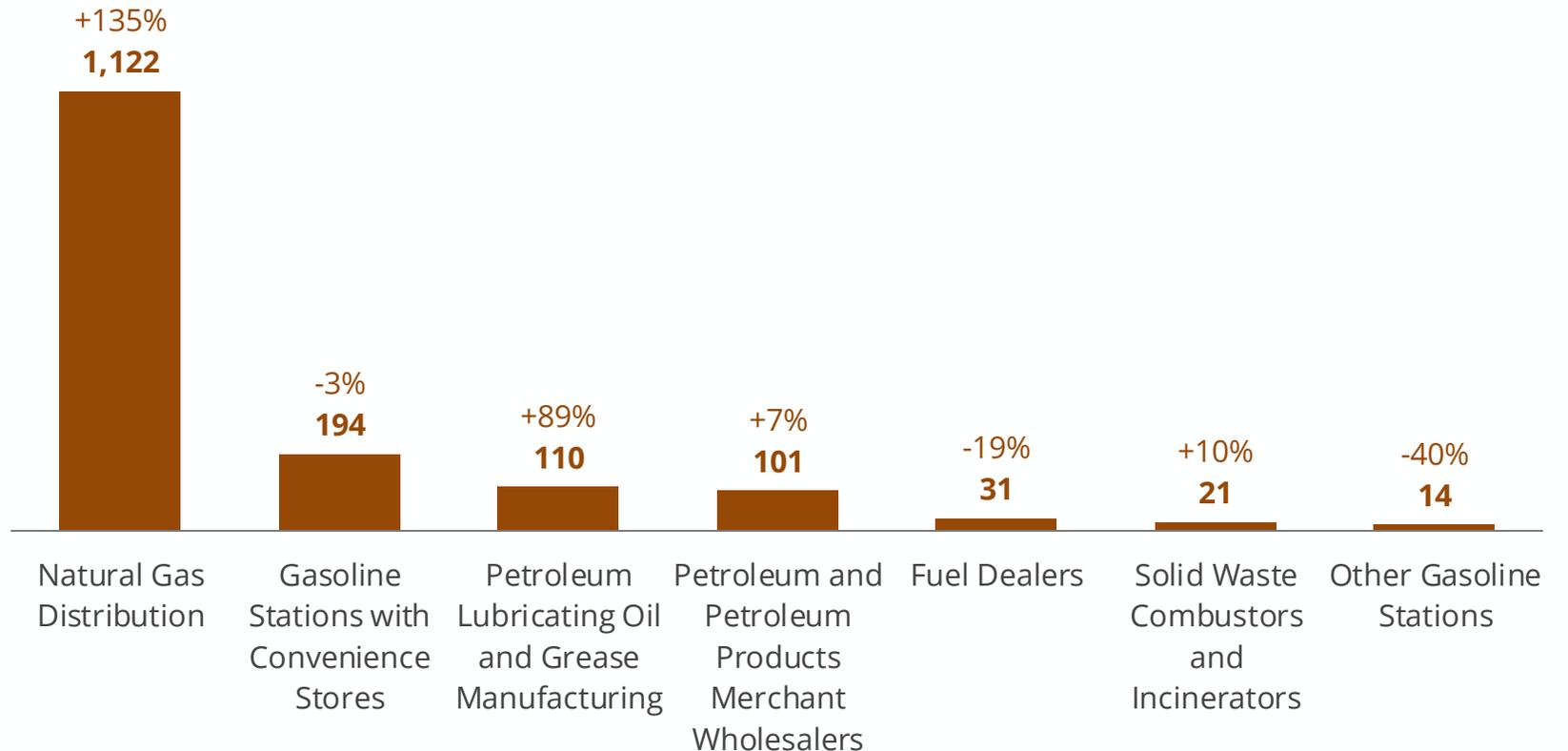
Federal data shows 1,600 local jobs in fossil fuel industries, a 44% increase since 2010. This number does not include jobs within supporting divisions of large fossil fuel companies like Chevron, or supporting businesses in other industries.

Largest Employer in Richmond (2021)



**3,264 Total Employees**

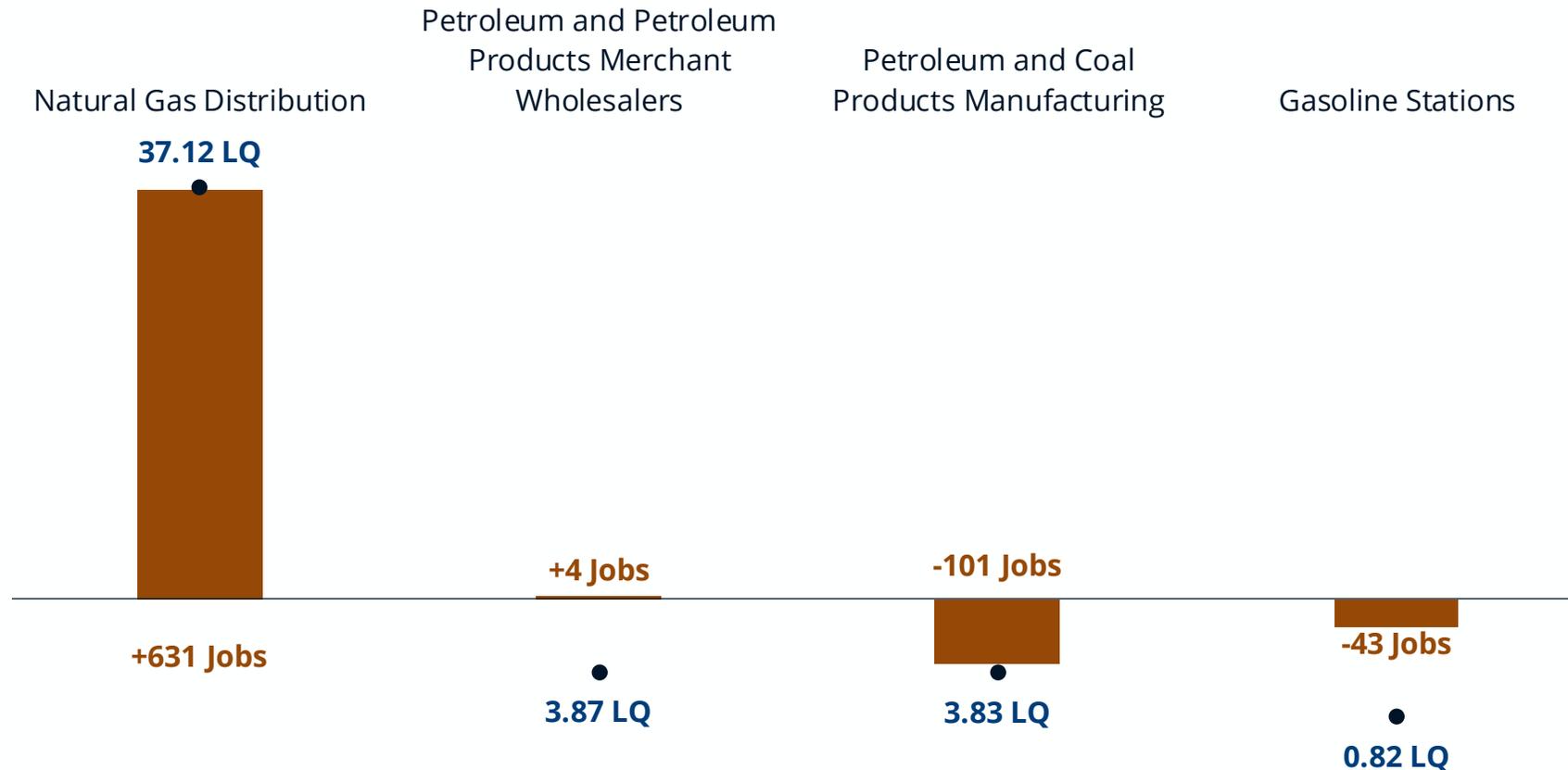
Extractive Industry Jobs in Richmond (2021) with Change in Jobs (2010-2021)



## OVERALL ECONOMY | FOSSIL FUEL CLUSTER

Natural Gas Distribution, Petroleum Products Wholesalers, and Petroleum Products Manufacturing, all have very high location quotient in Richmond.

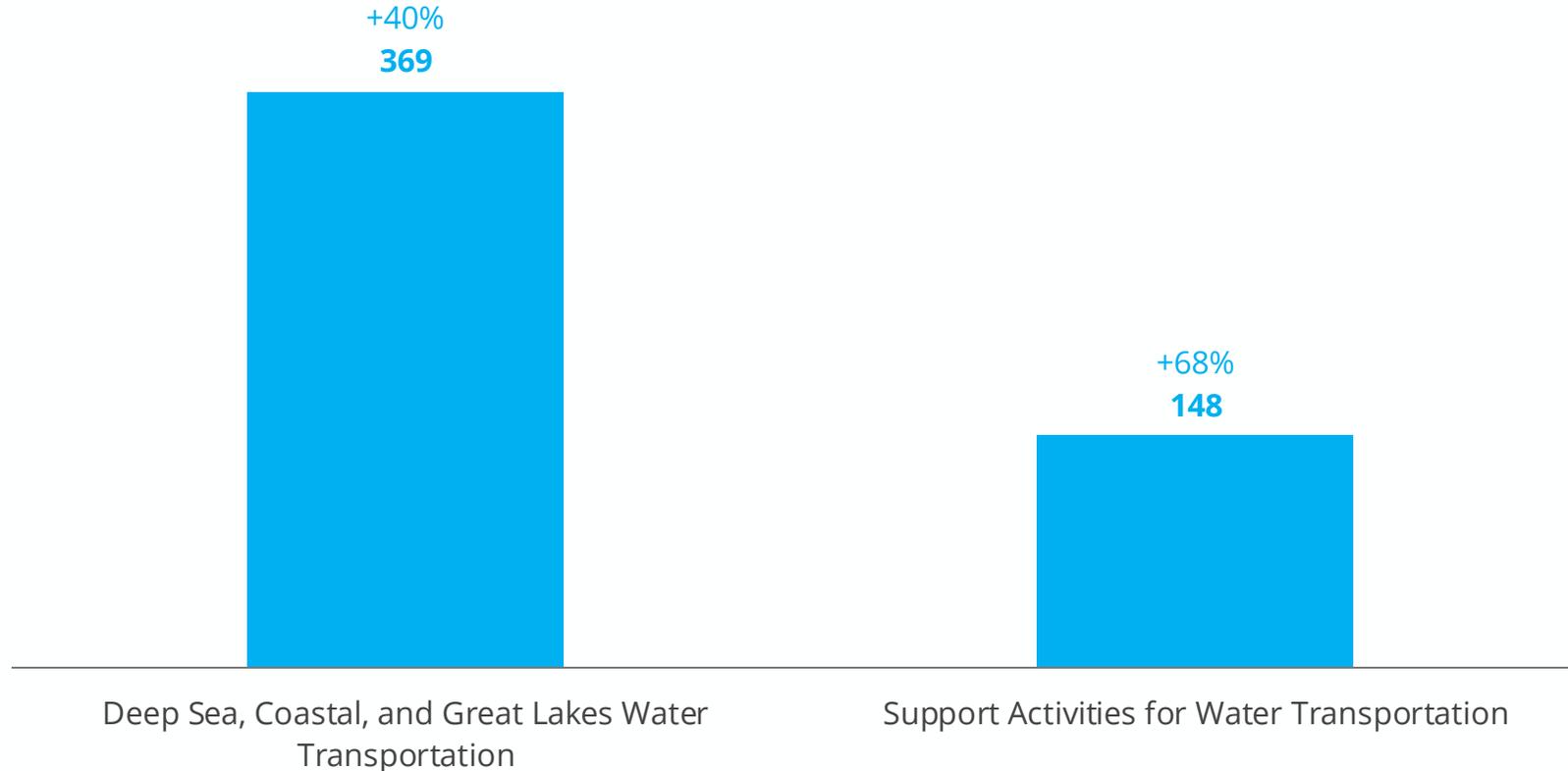
**Richmond's Fossil Fuel Industry Cluster LQs (2021) and Number of Jobs Gained/Lost due to Competitive Factors (2010-2021)**



## OVERALL ECONOMY | WATER TRANSPORTATION CLUSTER

Richmond has over 500 jobs in Water Transportation, including support activities for water transportation, experiencing significant growth over the last decade.

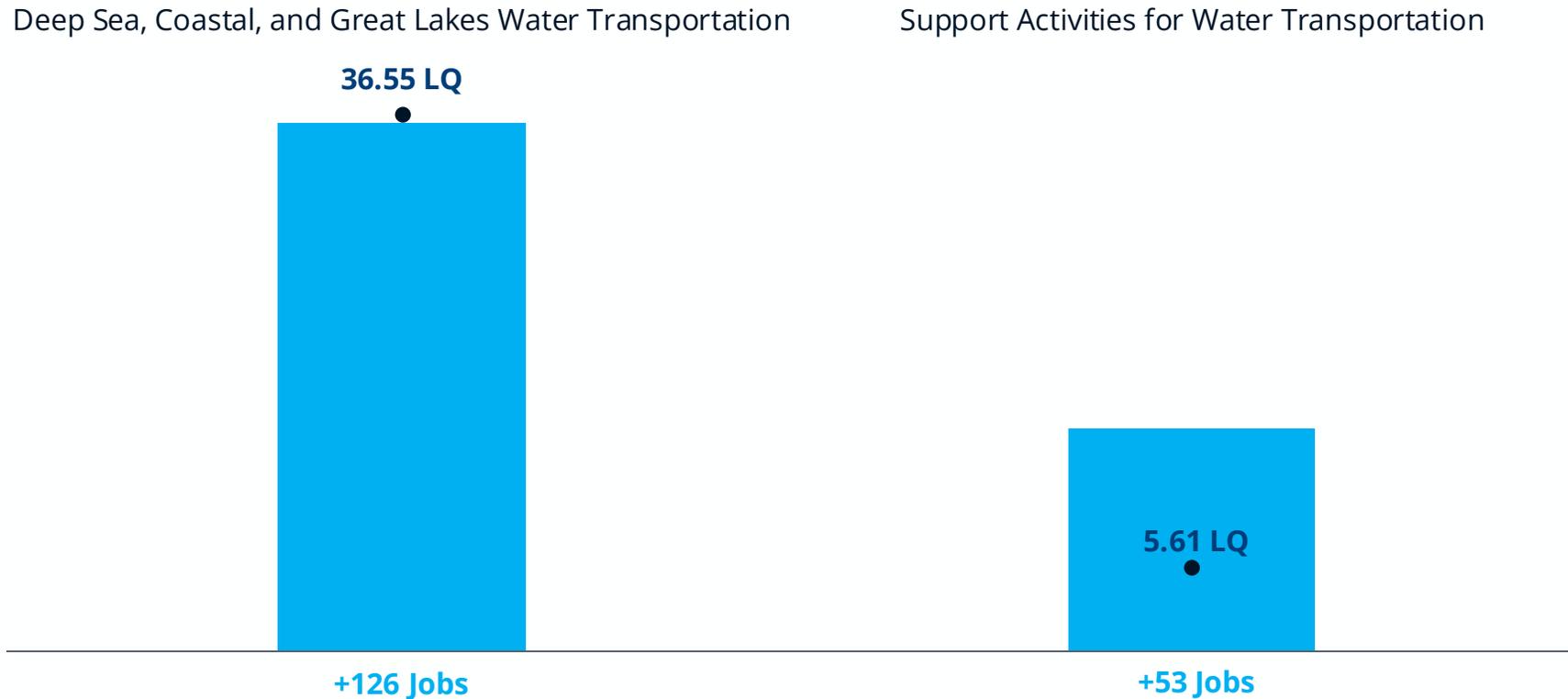
**Water Transportation Jobs in Richmond (2021) with Change in Jobs (2010-2021)**



## OVERALL ECONOMY | WATER TRANSPORTATION CLUSTER

Water Transportation overall has one of the highest location quotients in Richmond and has grown over the last decade due to competitive advantages.

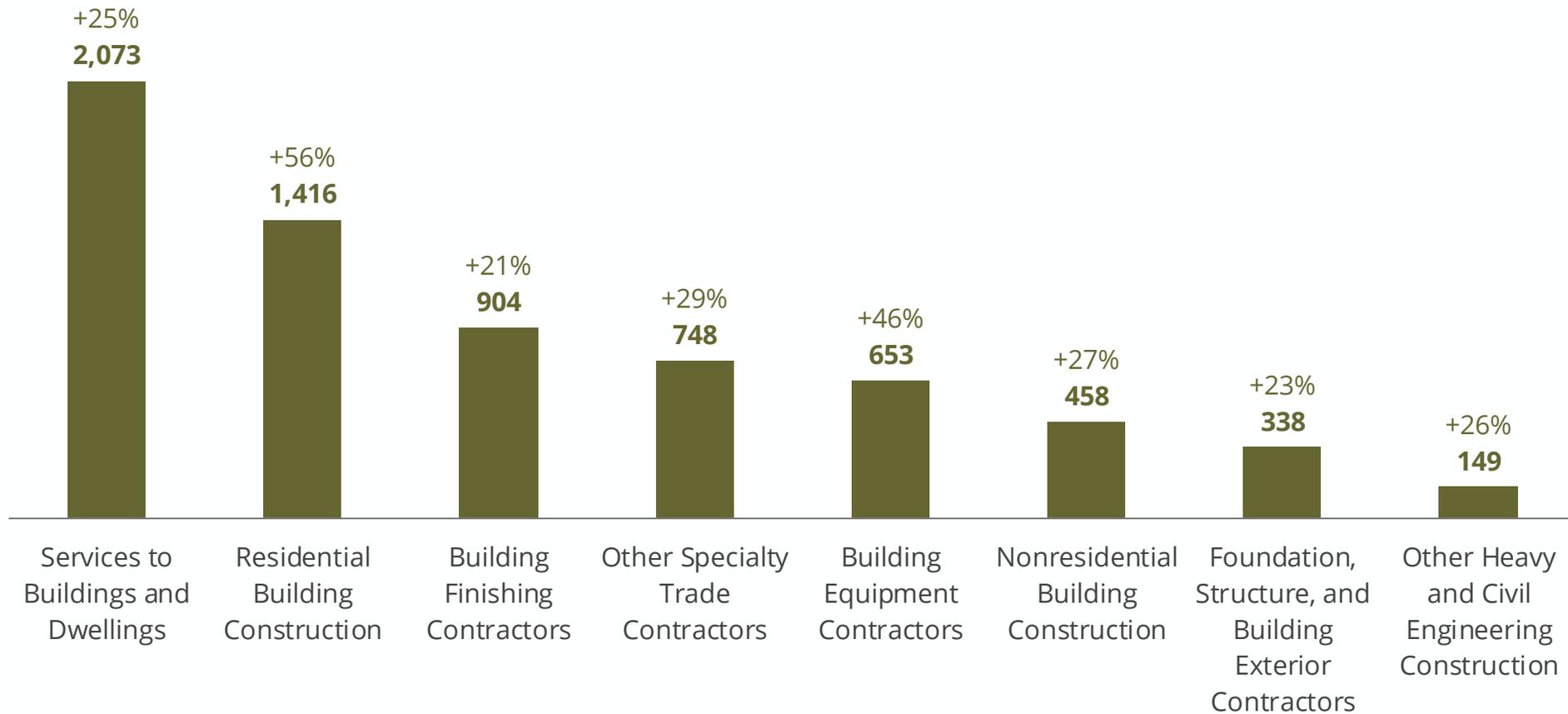
### Richmond's Water Transportation Cluster LQs (2021) and Number of Jobs Gained due to Competitive Factors (2010-2021)



## OVERALL ECONOMY | BUILDING, CONSTRUCTION AND SERVICE CLUSTER

Richmond has 6,700+ jobs in building, construction, and related service industries, all of which have grown over the last decade.

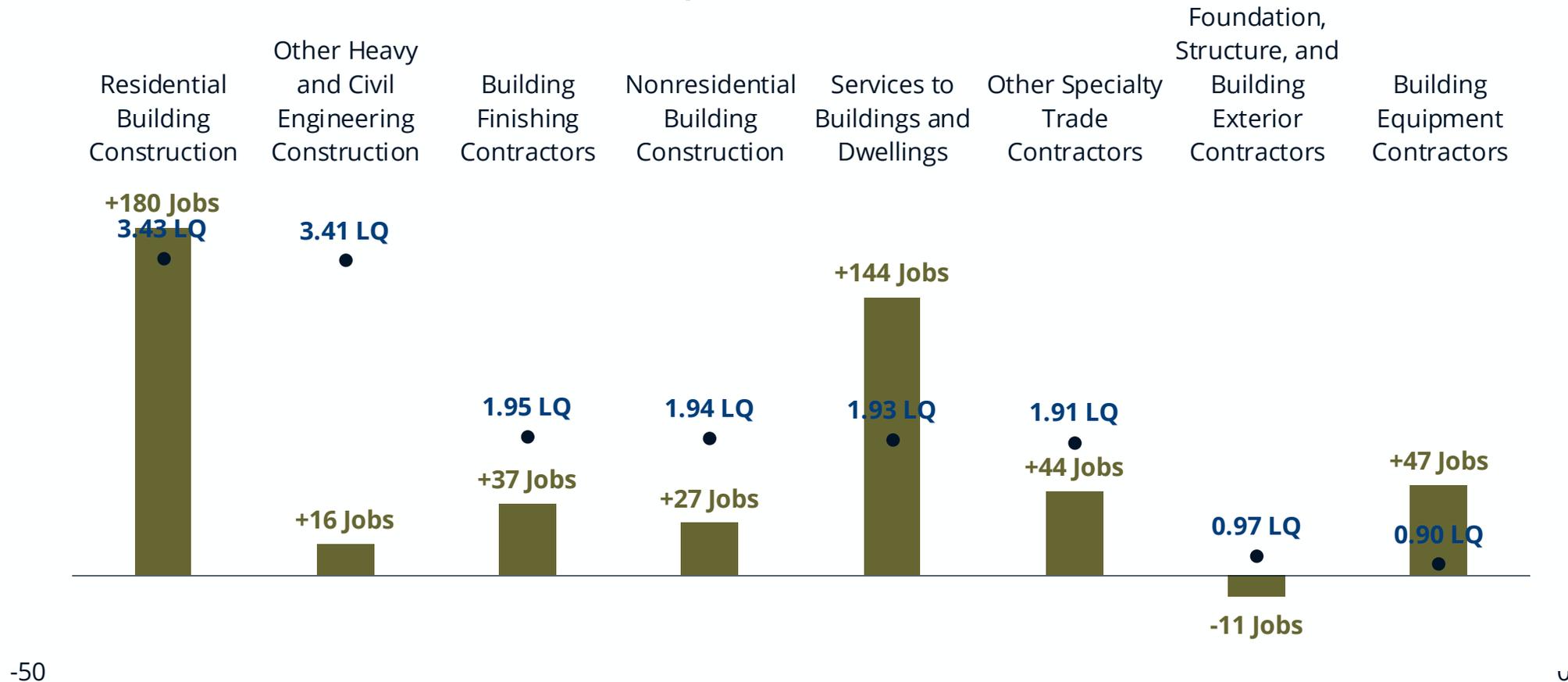
**Building, Construction and Service Jobs in Richmond (2021) with Change in Jobs (2010-2021)**



## OVERALL ECONOMY | BUILDING, CONSTRUCTION AND SERVICE CLUSTER

Residential Construction and Services to Buildings have gained significant number of jobs over the last decade due to competitive factors.

**Richmond's Building, Construction, and Service Cluster and Number of Jobs Gained/Lost due to Competitive Factors (2021)**



### Key Takeaways

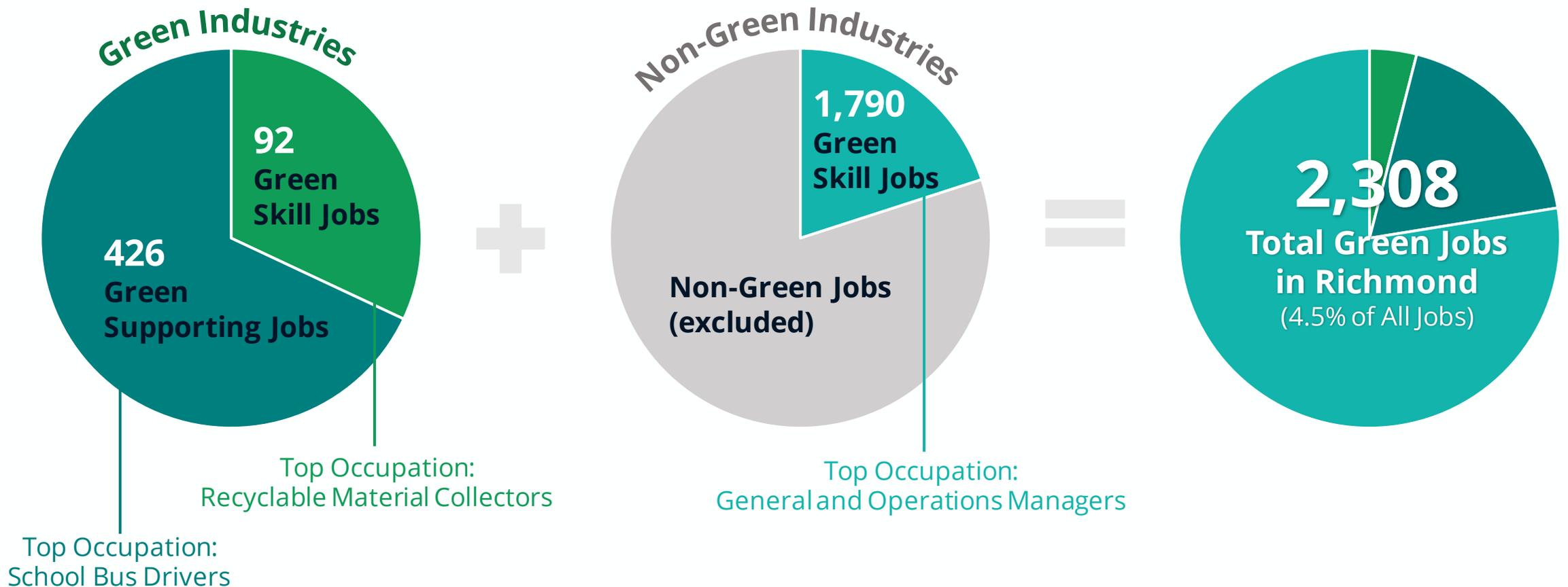
- 1 Richmond has approximately 51,000 total jobs.
- 2 Almost one-half of Richmond's workforce is employed in one of its top three sectors: industrial, and professional service, and retail.
- 3 Richmond's key sectoral strengths relate to utilities, water transportation, building construction, machinery repair/maintenance industries, and research & development.
- 4 Richmond's key industries point toward opportunities for the creation of high-road Green Jobs.

RICHMOND'S

GREEN JOBS TODAY

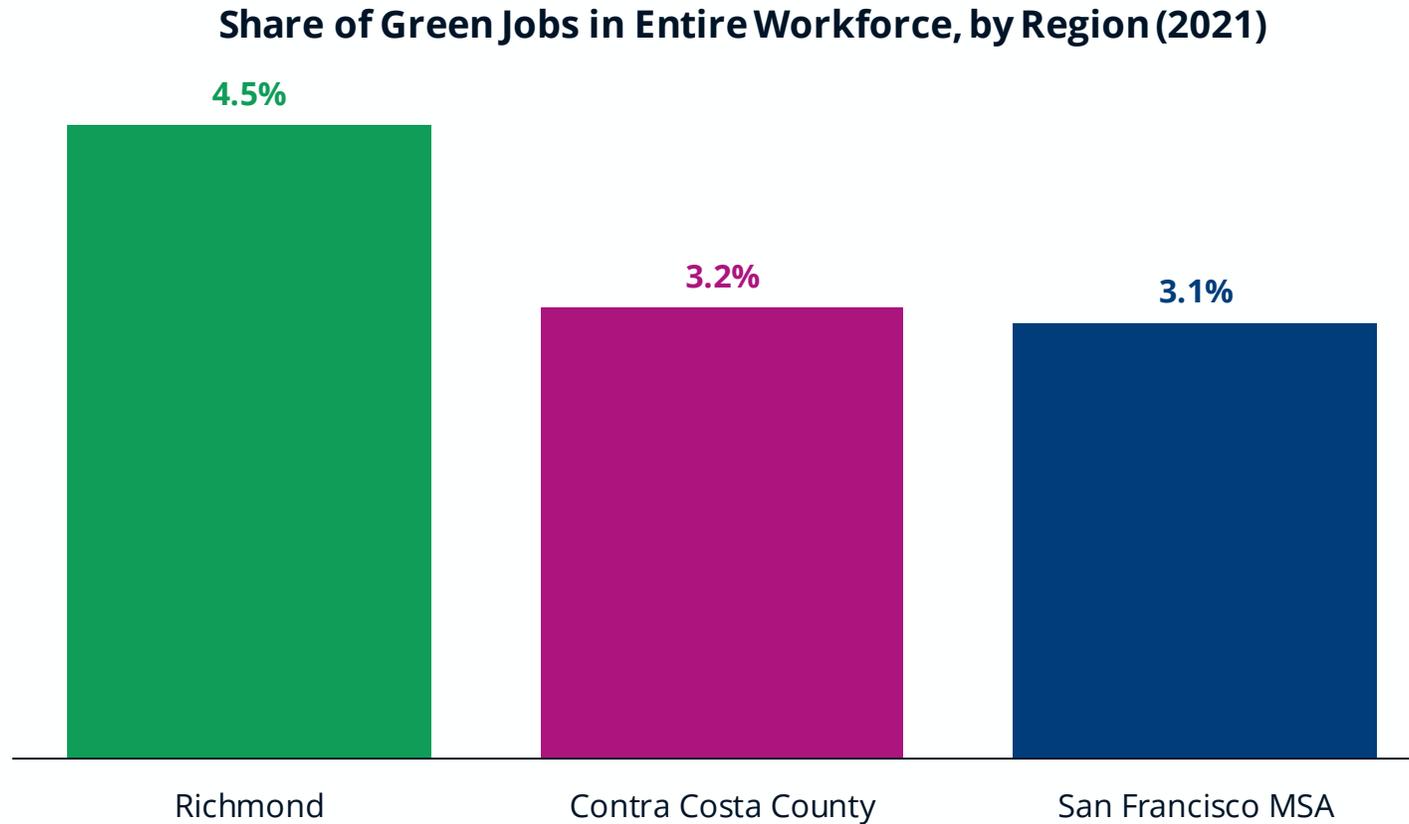
## GREEN JOBS | TOTALS

Today, Richmond's economy includes approximately 2,308 Green Jobs across both green (22%) and non-green (78%) industries. Further, 82% Green Jobs require specialized Green Skills, while the other 18% are supporting jobs in green industries.



## REGIONAL COMPARISON

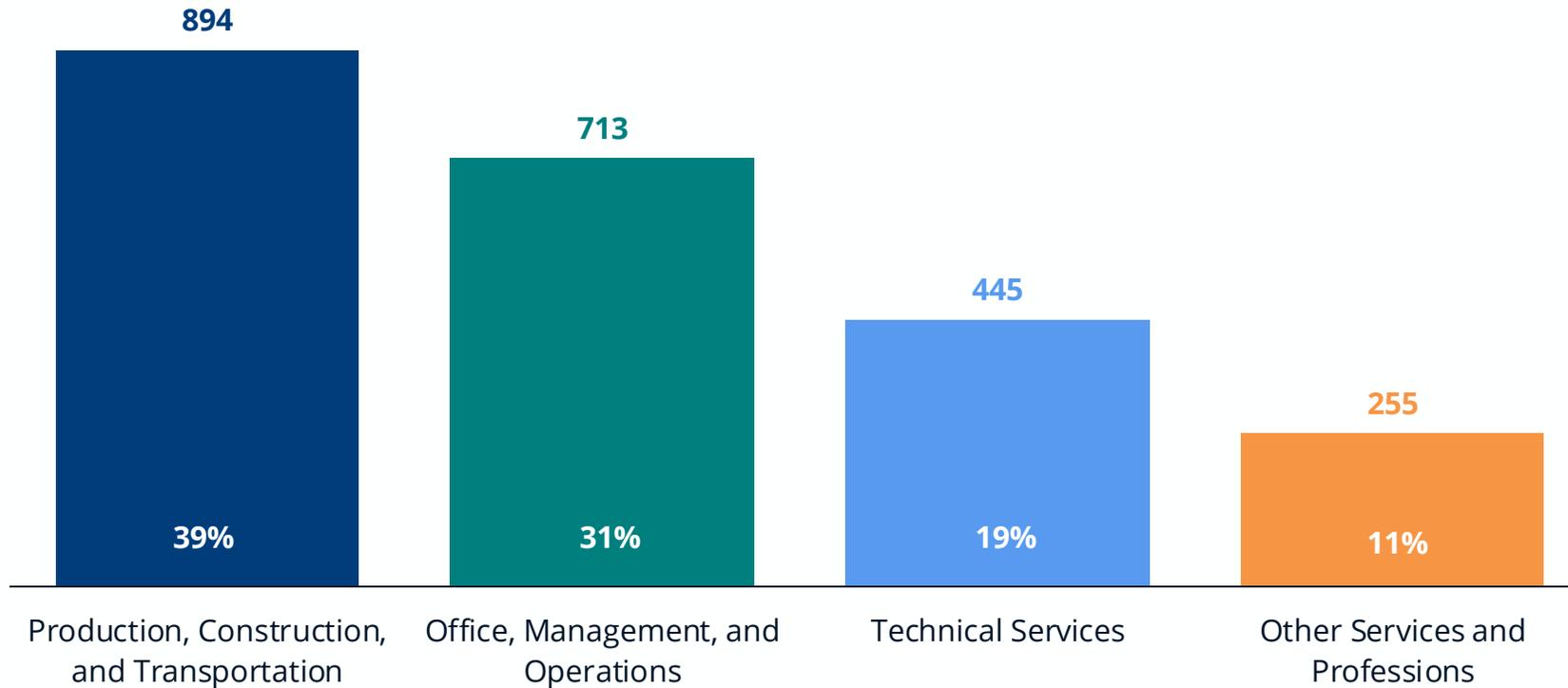
Richmond has a greater share of its workforce employed in Green Jobs compared to both the Contra Costa County and the entire MSA.



## GREEN JOBS TODAY

Almost 40% of Green Jobs fall under Production, Construction, and Transportation occupations, followed by 31% in Office, Management, and Operations occupations.

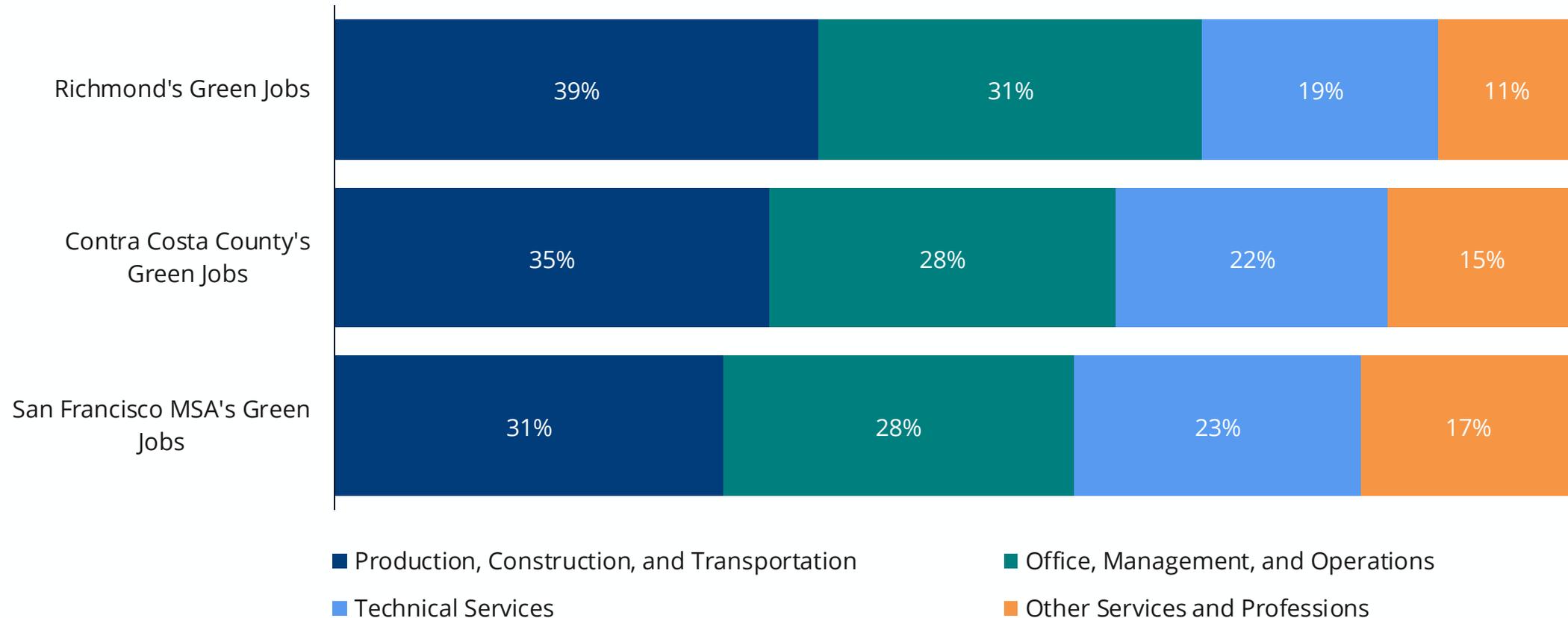
Green Jobs by Occupational Groups in Richmond (2021)



## GREEN JOBS | OCCUPATION CATEGORIES

In Richmond, 39% of Green Jobs are in Production, Construction, and Transportation occupations, whereas in surrounding areas, Green Jobs are more evenly divided between occupation categories.

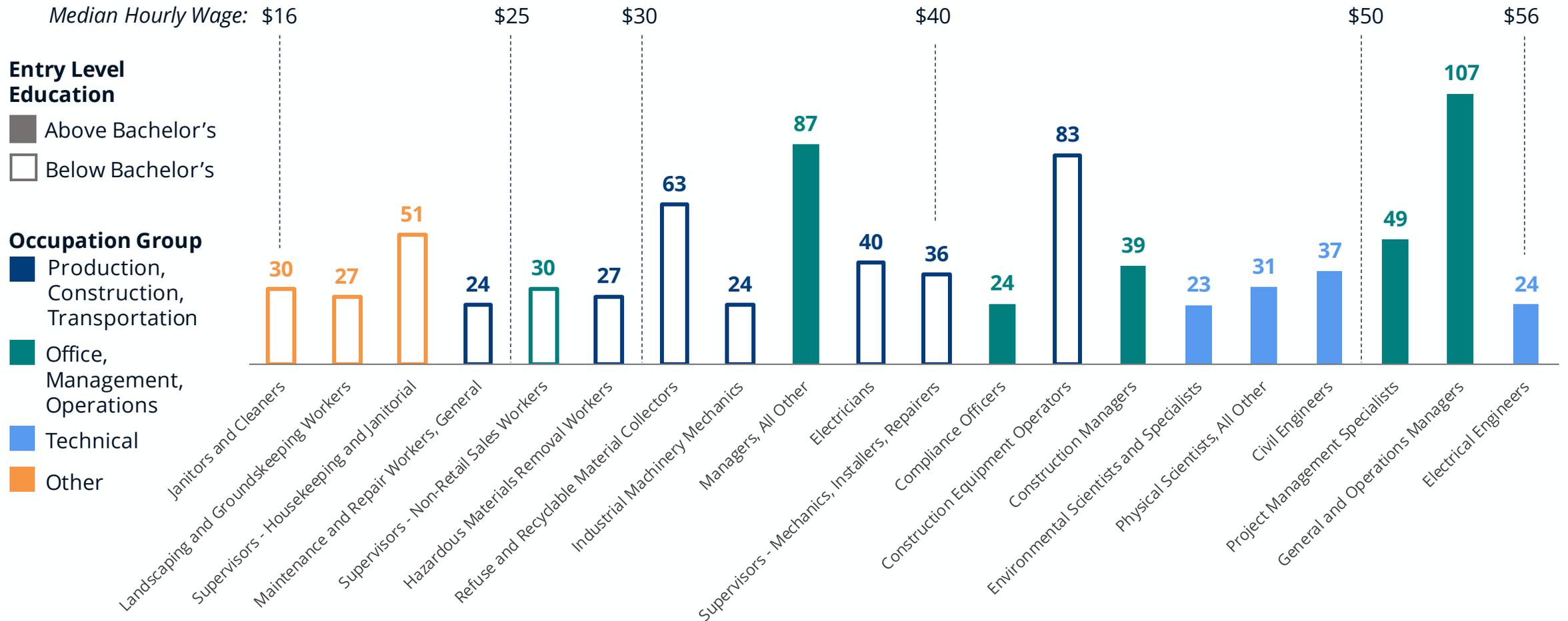
Green Jobs by Occupation Group, by Region (2021)



## GREEN JOBS | TOP OCCUPATIONS

Managers (General and Operations Managers and All Other) is the largest Green Skill occupation, constituting 194 jobs or 8.4% of all Green Jobs in Richmond.

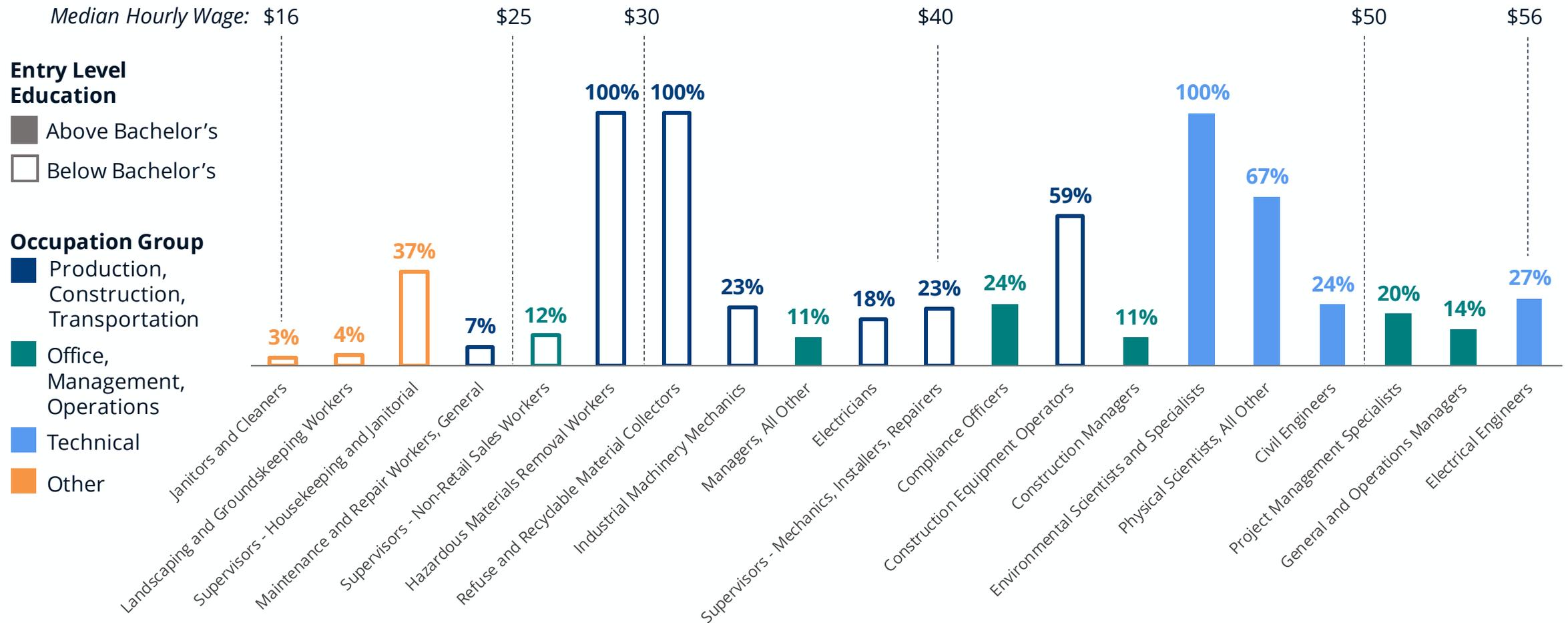
Green Jobs in Top 20 Occupations for Green Skill Jobs in Richmond (2021)



## GREEN JOBS | TOP OCCUPATIONS

In some occupations like environmental scientists and recycling collectors, all jobs require Green Skills. In most other occupations, only a portion of jobs require Green Skills.

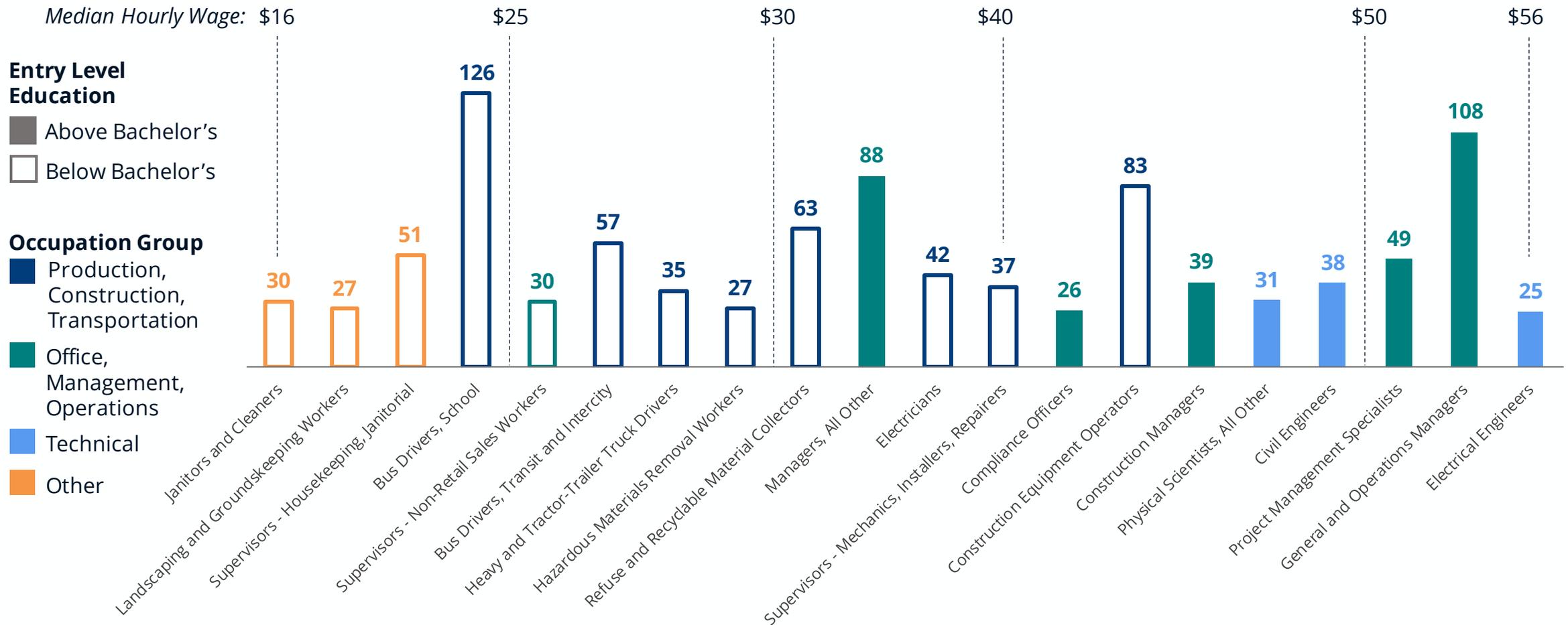
Share of Green Jobs in Top 20 Occupations for Green Skill Jobs in Richmond (2021)



## GREEN JOBS | TOP OCCUPATIONS

The top 20 occupations constitute 44% of all Green Jobs in Richmond, and only 8 require education above a B.A.

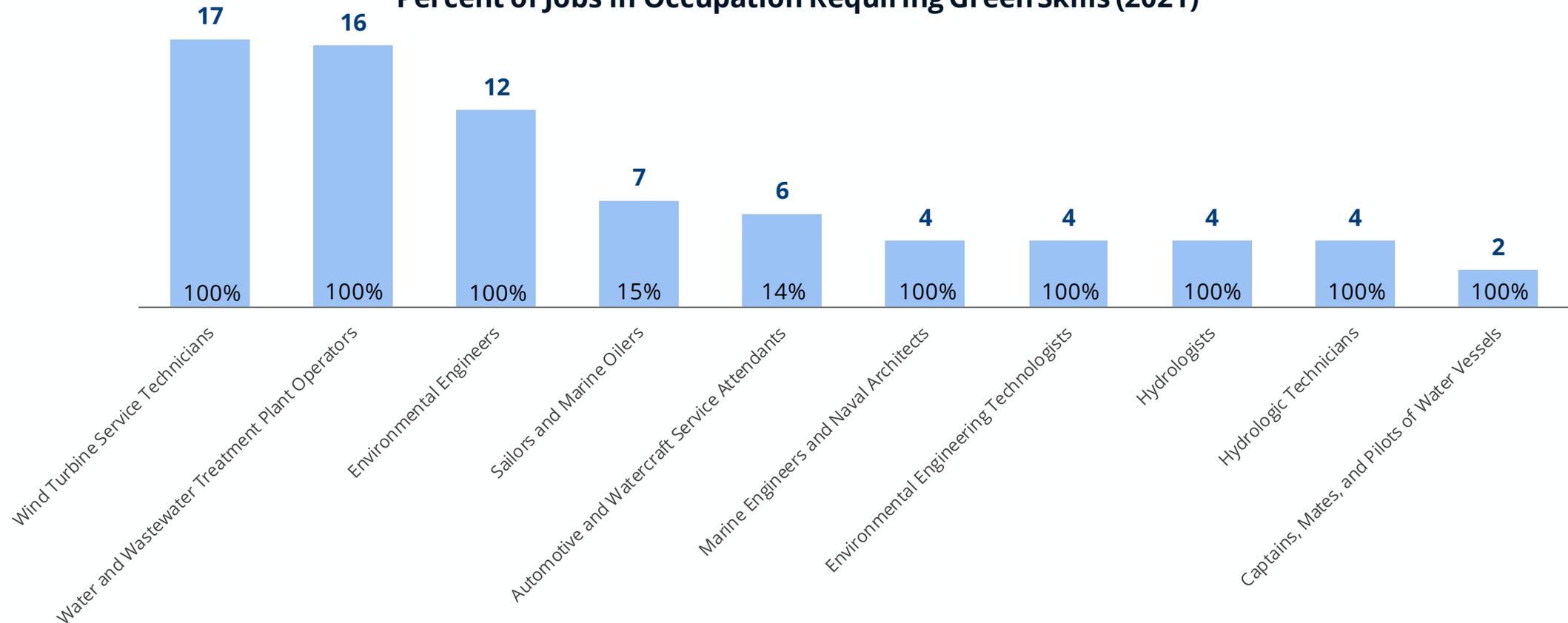
Number of Green Jobs in Top 20 Occupations for Green Jobs in Richmond (2021)



## GREEN JOBS | GREEN-BLUE OCCUPATIONS

There are 77 jobs in Richmond readily identifiable as “Green-Blue Jobs”, comprising 3% of all Green Jobs. These jobs require Green Skills and are in occupations that are significantly involved in the blue economy.

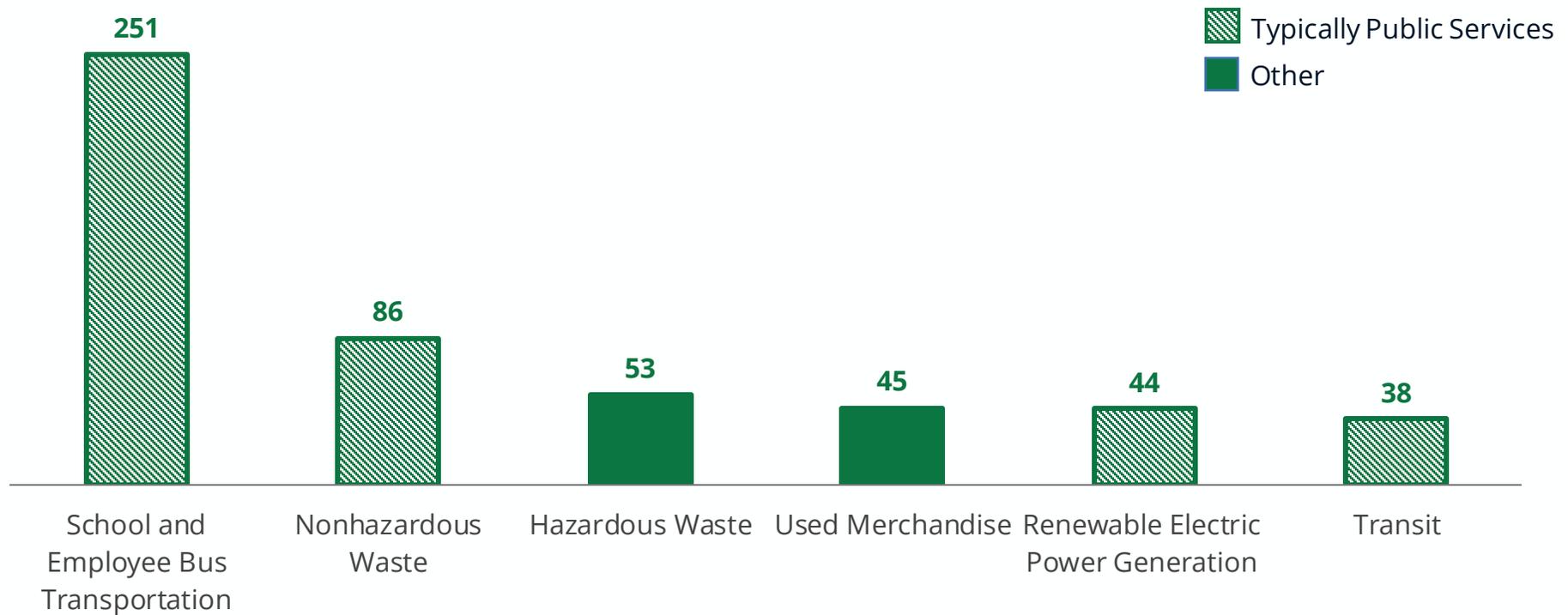
**Richmond’s Green-Blue Jobs by Occupation and Percent of Jobs in Occupation Requiring Green Skills (2021)**



## GREEN JOBS TODAY

Among green industries, School and Employee Bus Transportation make up 49% of Green Jobs, followed by Nonhazardous Waste (17%), and Hazardous Waste (10%).

**Green Jobs in Green Industries in Richmond (2021)**



## GREEN JOBS | TOP-HIRING EMPLOYERS

Veolia, Republic Services, Schnitzer Steel, Cascade Environmental, and ICF International are actively hiring the greatest number of Green Skill Jobs in Richmond.



*Examples: Wastewater Operators, Collections Technicians, Maintenance Technicians*



*Examples: Driller Assistants, Drillers, Field Assistants*



*Examples: Customer Service Advisors, Production Crews, Vehicle Purchasing Agents*



*Examples: Recycling Truck Drivers, Transfer Drivers, Landfill Heavy Equipment Operators*



*Examples: Environmental Chemists, Data Validation Specialists, Chemistry Laboratory Technicians*

## GREEN JOBS | TOP SKILLS

Green Jobs in Richmond most often require Management, Communications, and Operations Skills in addition to Green Skills such as Environmental Health & Safety.

### Top 5 Skills in Jobs Requiring Green Skills

Where size of bubbles represents relative occurrence of these skills.



### Top 5 Green Skills in Green Jobs

Where size of bubbles represents relative occurrence of these skills.

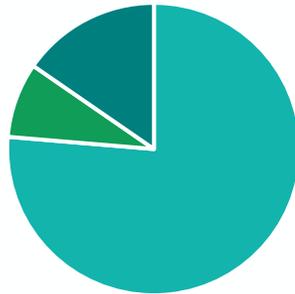


## GREEN JOBS | TOP SKILLS

Many Green Jobs demand common non-Green Skills such as communication and management, meaning many workers are already partially qualified to work in Green Jobs.

### Green Skill Jobs and Supporting Jobs

*in both green and non-green industries*



The top skills listed across all Green Job postings include communications, management, and operations. Additional skills include customer service, leadership, writing, and planning. This indicates that many professionals may be able to readily be employed in Green Jobs despite preconceived notions about the prerequisites.



**Sample Green Job Titles Posted in Richmond:** General Managers, Production Supervisors, Research Associates, Project Managers, Maintenance Supervisors

### Green Skill Jobs

*in green industries*



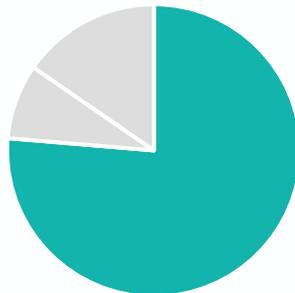
Some Green Skill Jobs call for environmentally-specific skills like data compilation, environmental planning, or wastewater operator certification.



**Sample Green Job Titles Posted in Richmond:** Laboratory Technicians, Chemical Process Operators, Field Assistants, Project Engineers, Environmental Chemists

### Green Skill Jobs

*in non-green industries*



Finally, in non-green industries, many workers may develop Green Skills that they use during some parts of their job. For instance, construction and operations are both frequently listed in green skill job postings – many construction professionals have transferrable skills that can be used in Green Jobs.



**Sample Green Job Titles Posted in Richmond:** Operator Helpers, Maintenance Technicians, Drillers, Recycling Truck Drivers, Production Crews, Warehouse Receivers, Vehicle Maintenance

### Key Takeaways

- 1 There are almost 2,300 Green Jobs in Richmond, meaning more than one in every 22 jobs requires Green Skills, is in a green industry, or both.
- 2 Forty percent of Green Jobs are in Production, Construction, and Transportation occupations, which typically do not require a college degree, but also tend to pay less than the average job.
- 3 A large proportion of Green Jobs in Richmond are in providing public services, such as school transportation, public transit, and waste collection/disposal.
- 4 Richmond companies actively hiring for Green Skills include those providing environmental remediation services; recycling metals; and selling environmentally friendly food and other consumer products.
- 5 The most commonly sought-after Green Skills are related to environmental health and safety, followed by those related to environmental science and regulations.
- 6 Green jobs also require common non-Green Skills, such as those related to communication, management, and operations.

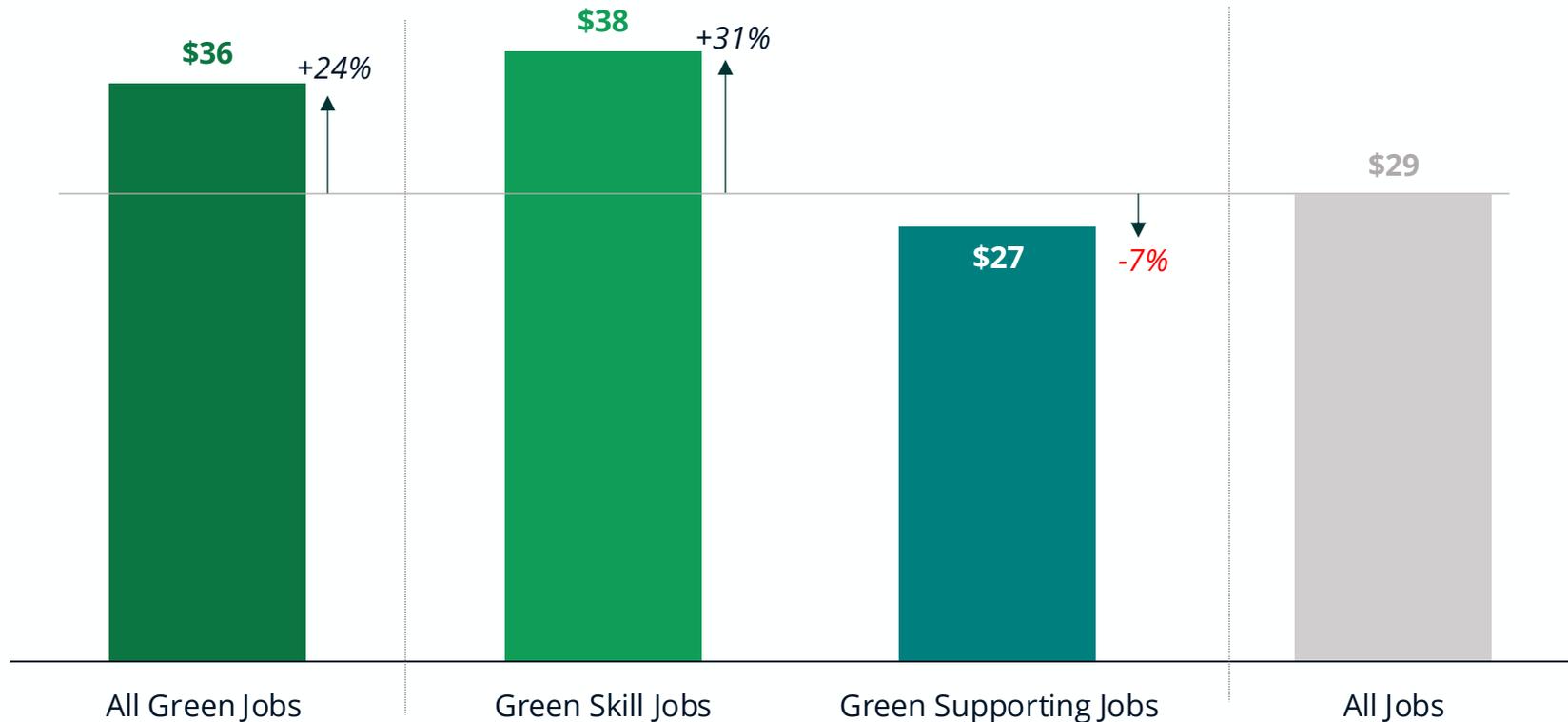
RICHMOND'S

GREEN JOB WAGES

## GREEN JOB WAGES

Overall, Green Job workers earn 24% higher wages compared to the average Richmond worker. Within Green Jobs, Green Skill Jobs pay a 31% premium, while wages in Green Supporting Jobs are slightly lower than the overall economy.

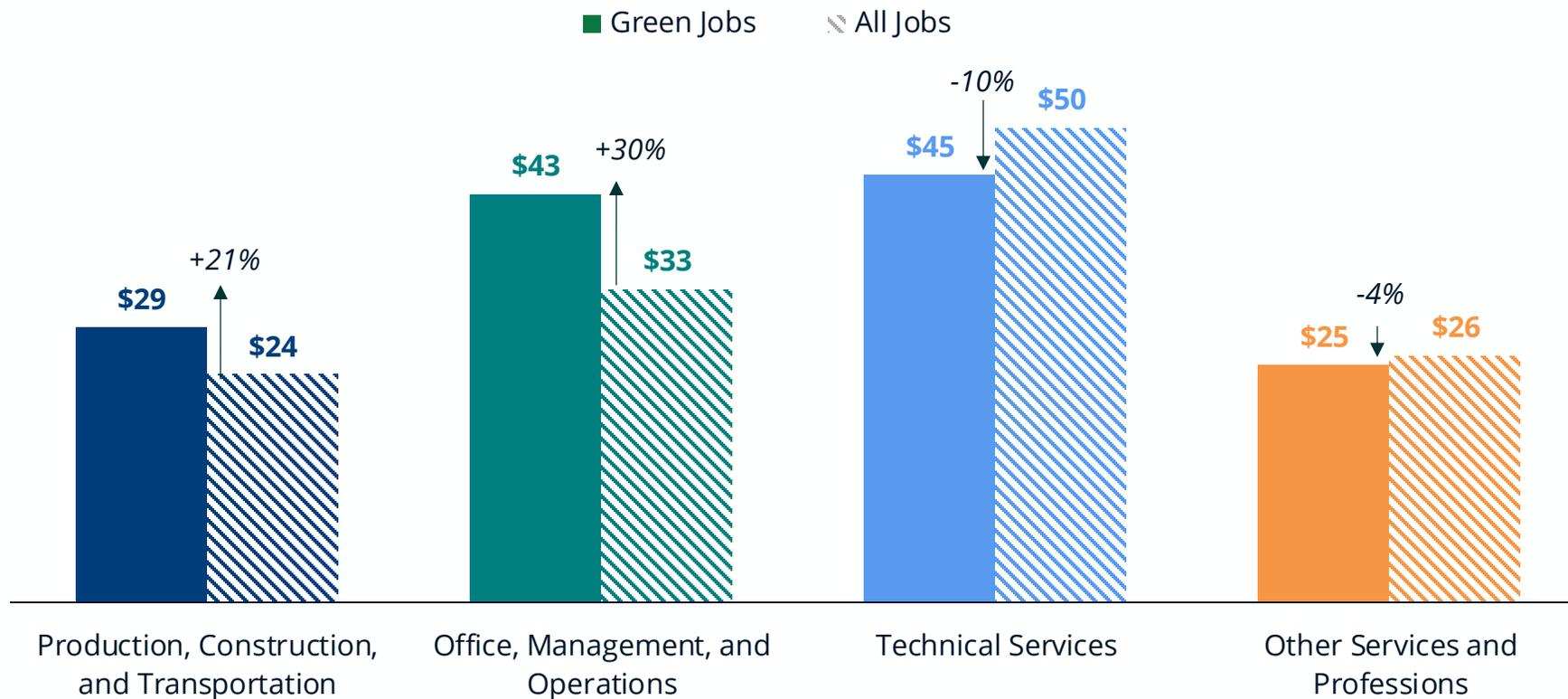
Median Hourly Wage of Green Jobs by category in Richmond (2021)



## GREEN JOB WAGES

Green Jobs in Office, Management, and Operations and Production, Construction, and Transportation pay 1.3 times and 1.2 times that of overall economy, while Green Jobs in Technical Services pay 0.9 times. Green jobs in Other Services & Professions pay at par.

Median Hourly Wage of Green Jobs by Occupational Groups in Richmond (2021)



## GREEN JOB WAGES

Green Jobs pay higher wages than the overall economy irrespective of the educational attainment, but especially in jobs not requiring a B.A., where Green Jobs pay 17% more. Green Jobs requiring a B.A. or above pay 85% more than ones that don't require a B.A.

Median Hourly Wage of Green Jobs by Educational Attainment in Richmond (2021)



## Key Takeaways

- 1 The average Green Job in Richmond pays \$36 per hour, 24% higher than the average local job.
- 2 Green Jobs that require Green Skills tend to pay 41% more than Supporting Green Jobs, which are jobs in Green Industries that don't require Green Skills.
- 3 For jobs that don't require a college degree, Green Jobs pay a 17% premium (\$4 more per hour).
- 4 Green jobs that require a college degree pay on average 85% more than those that don't—a lower education premium for Green Jobs than for jobs overall.

RICHMOND'S

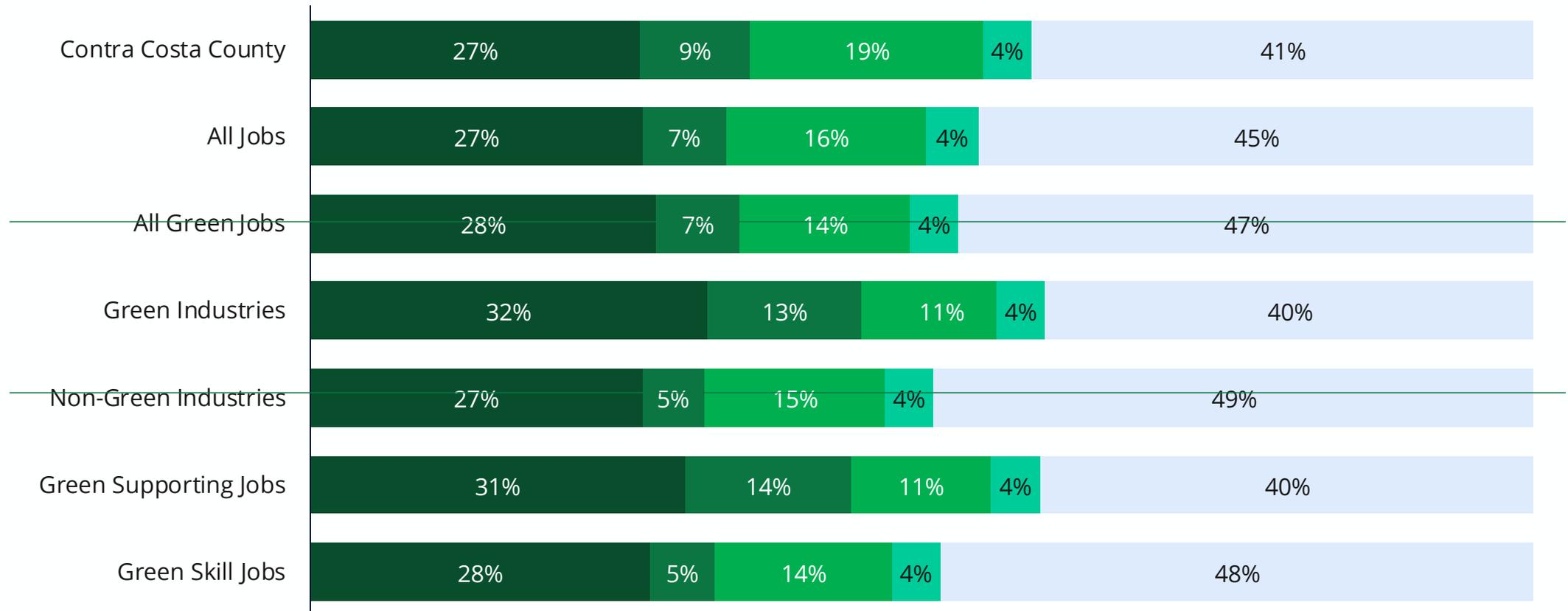
GREEN JOB DEMOGRAPHICS

## GREEN JOB DEMOGRAPHICS | RACE & ETHNICITY

Green Jobs are racially representative of Contra Costa County's overall economy but not of its population. Among Green Jobs, Green Supporting Jobs are more diverse than Green Skill Jobs. Similarly, green industries are more diverse than non-green industries.

**Racial Representation, by Category (2021)**

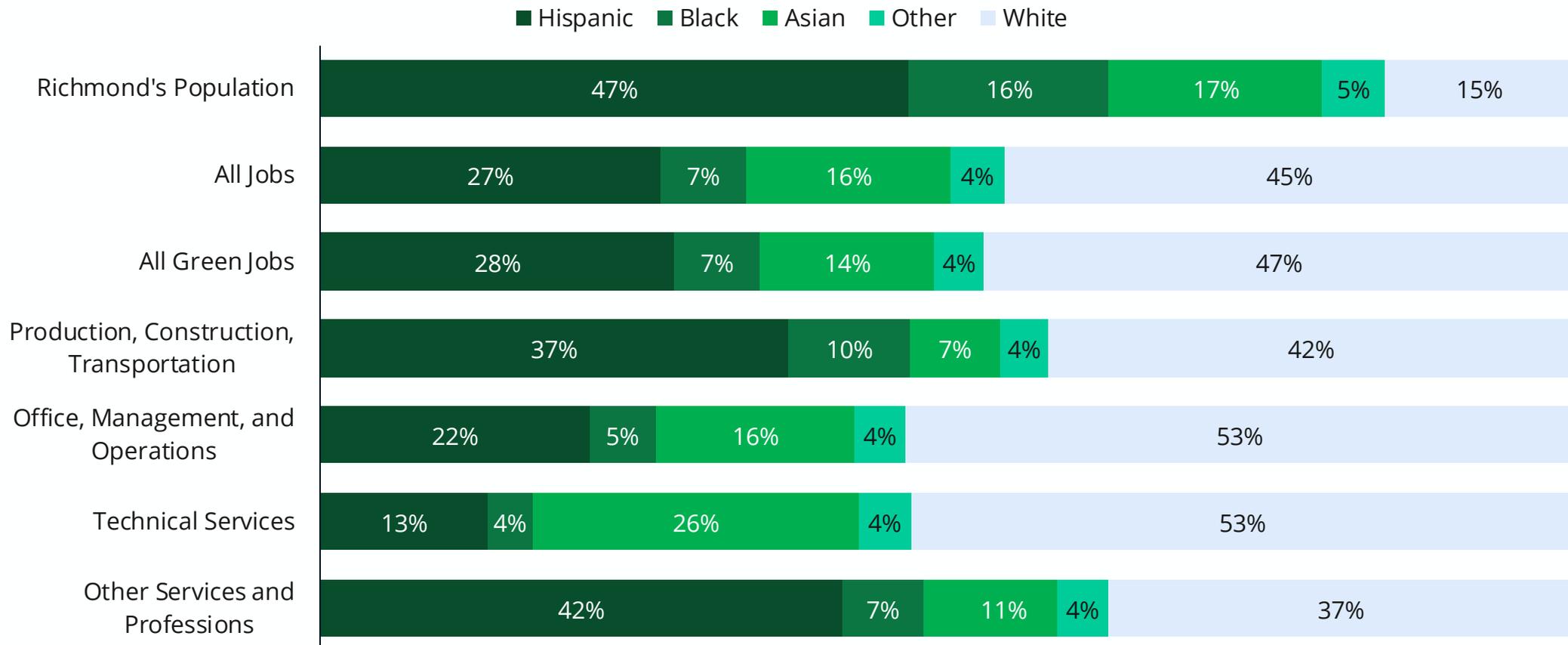
■ Hispanic ■ Black ■ Asian ■ Other ■ White



## GREEN JOB DEMOGRAPHICS | RACE & ETHNICITY

Within Green Jobs, Production, Construction, and Transportation and Other Services occupations are more diverse than Office, Management, and Operations and Technical services occupations.

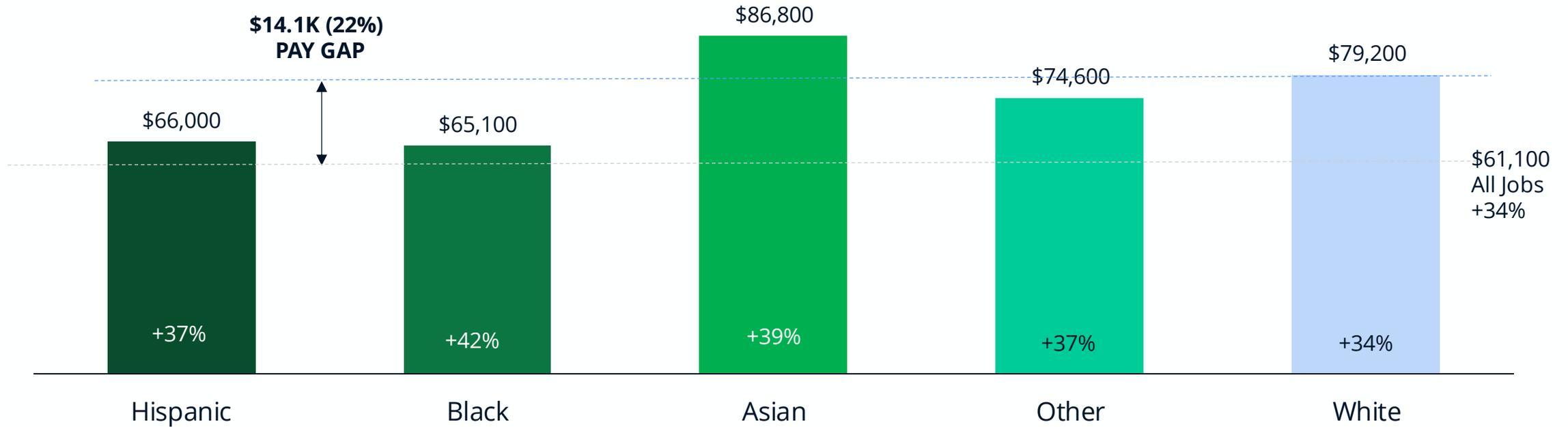
**Racial Representation, by Category (2021)**



## GREEN JOB DEMOGRAPHICS | RACE & ETHNICITY

Within Green Jobs, Black and Hispanic workers experience a wage gap of \$14.1K compared to their white counterparts. This gap has increased by \$0.8K since 2010, but relative wage gap is decreasing due to slightly faster increase in wages for Black and Hispanic workers.

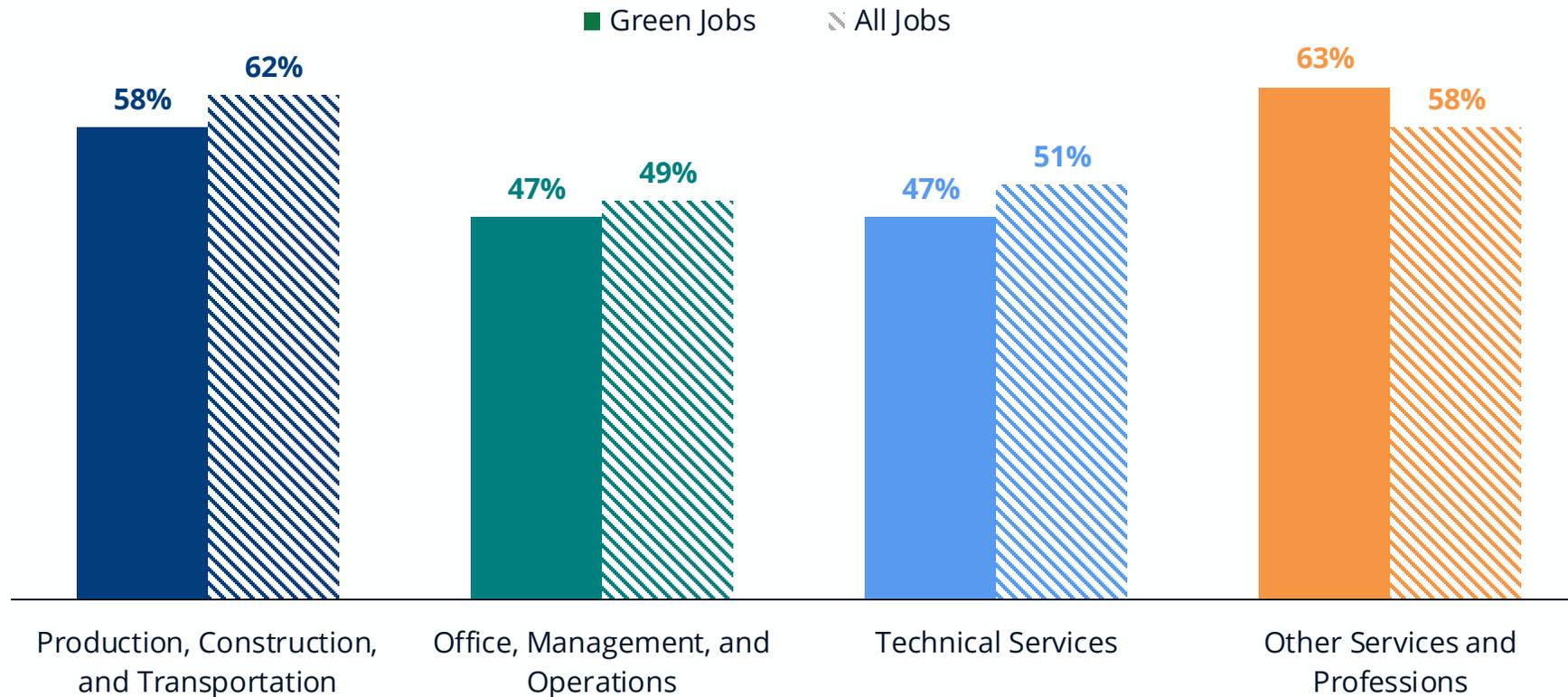
**Green Jobs Average Annual Earnings by Race in Richmond (2021)**



## GREEN JOB DEMOGRAPHICS | RACE & ETHNICITY

When compared to the overall economy, non-white worker representation in Green Jobs is slightly lower in all occupation groups except Other Services and Professions.

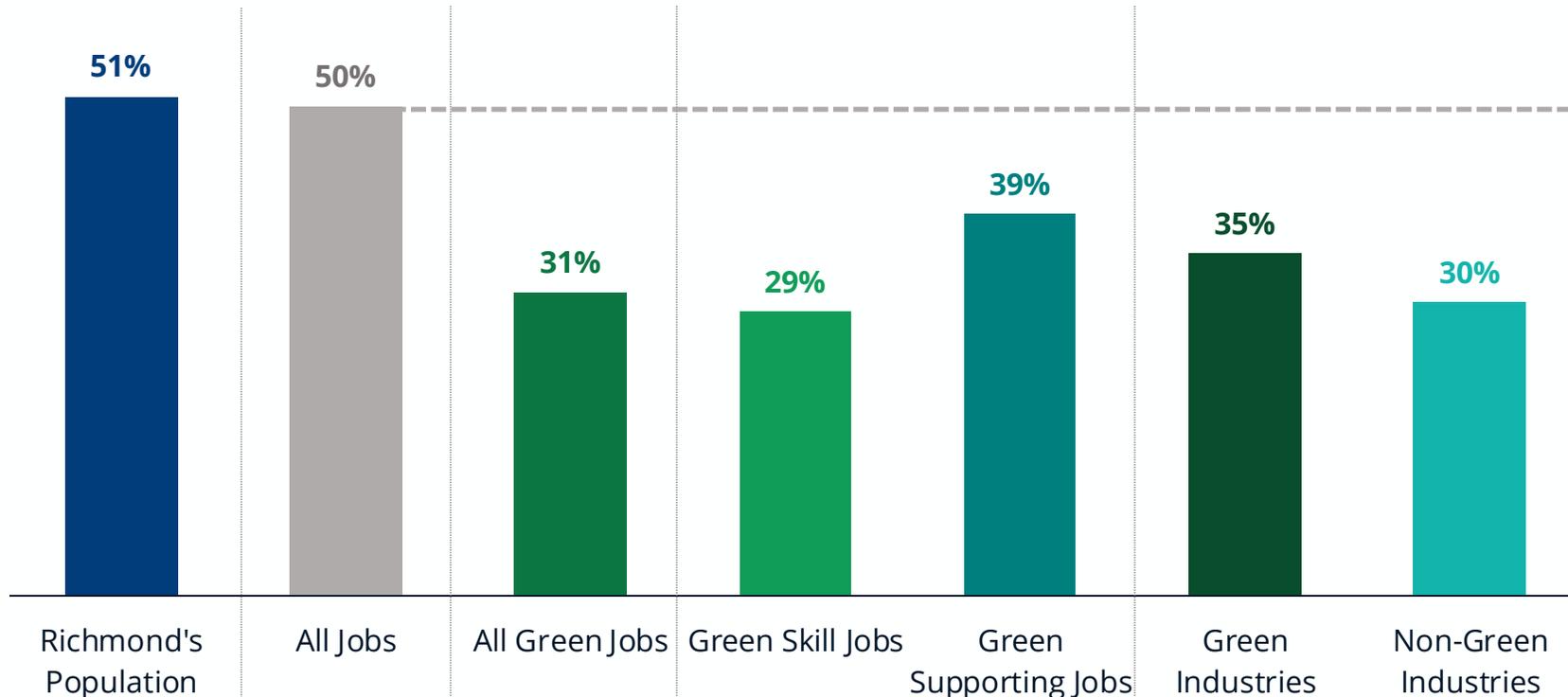
**Non-White Representation by Occupational Groups in Richmond (2021)**



## GREEN JOB DEMOGRAPHICS | GENDER

Green jobs are predominantly filled by male workers. Among job types, Green Skill Jobs have the lowest female representation. Similarly, non-green industries have lower female representation than green industries.

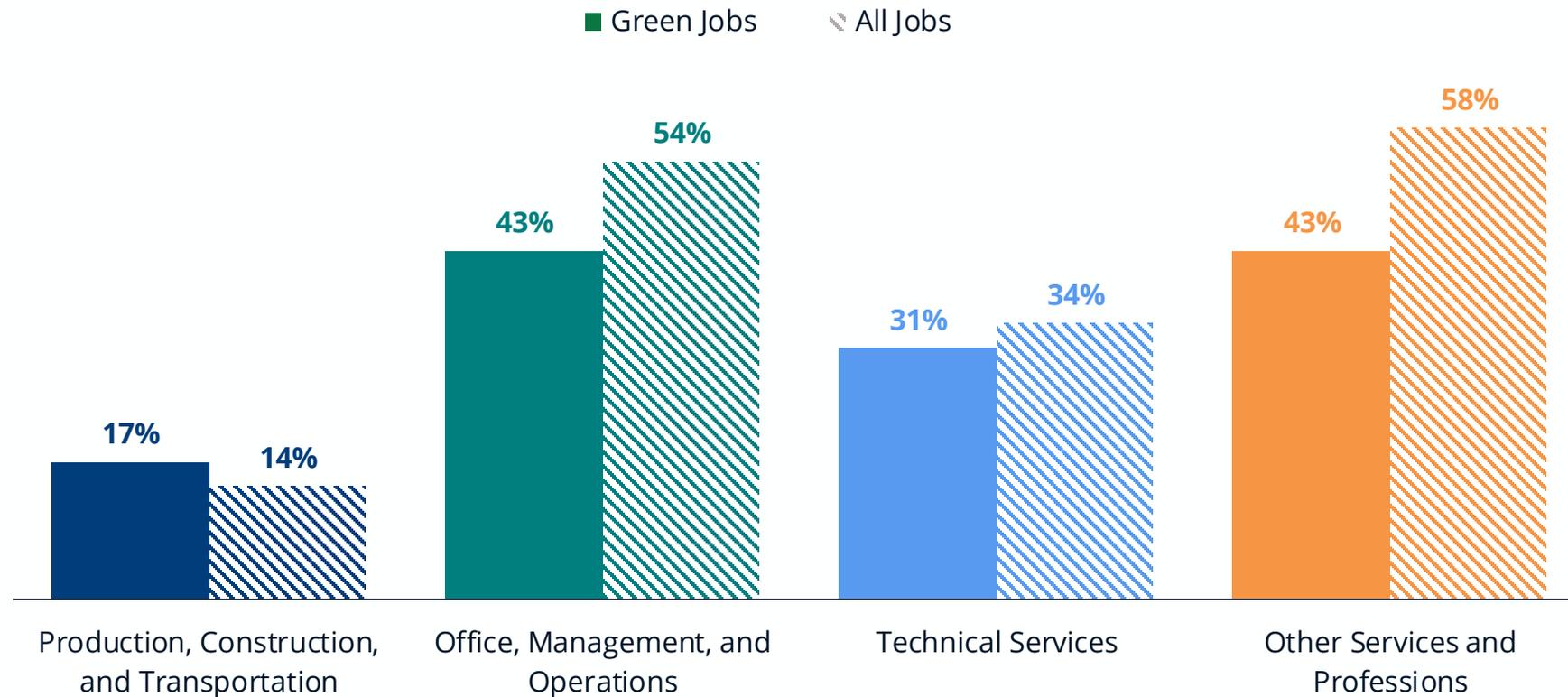
Female Representation, by Category (2021)



## GREEN JOB DEMOGRAPHICS | GENDER

Female representation is slightly better in Production, Construction, Transportation occupations compared to the entire economy. Otherwise, all occupation groups have lower female representation than Richmond's overall economy.

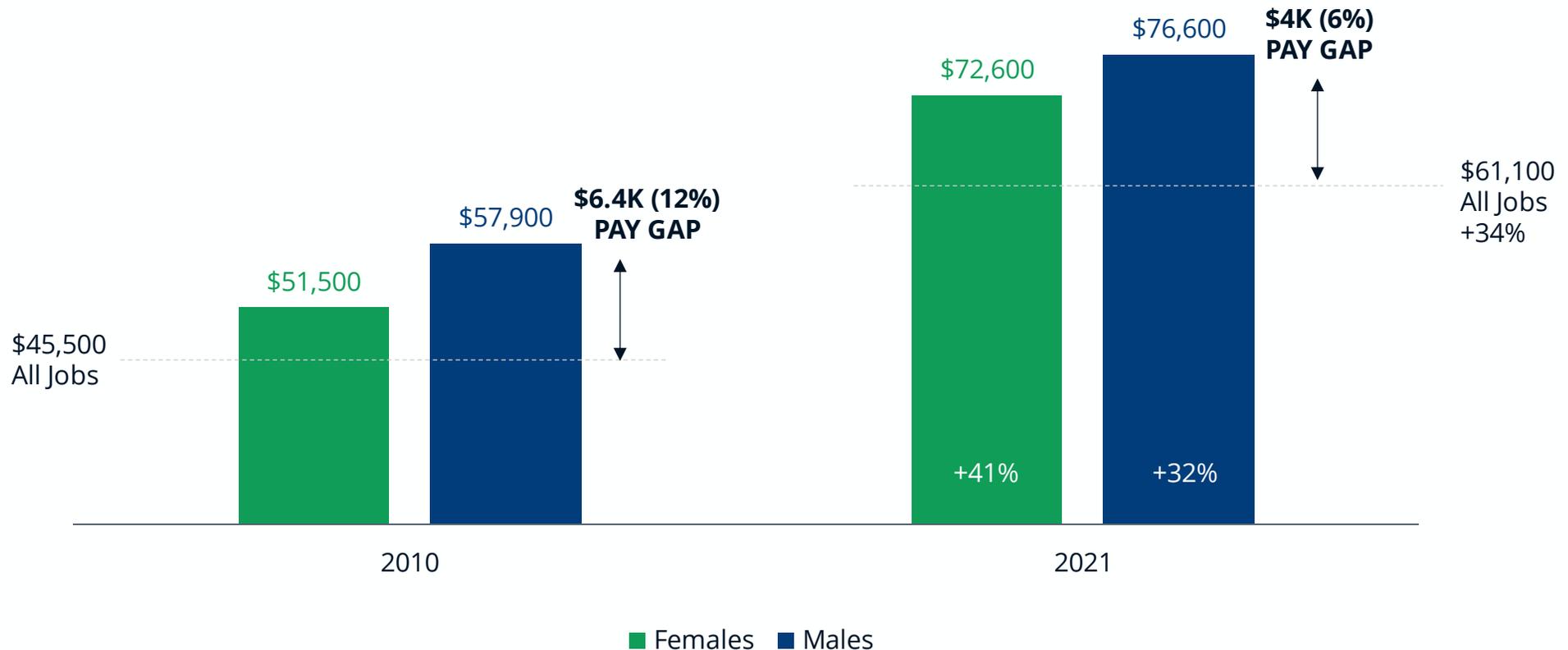
**Female Representation by Occupational Groups in Richmond (2021)**



## GREEN JOB DEMOGRAPHICS | GENDER

Over the last decade, the pay gap between male and female workers has decreased by about \$2.4K. The average wage of women in Green Jobs are increasing at a faster rate compared to their male counterparts and the overall economy.

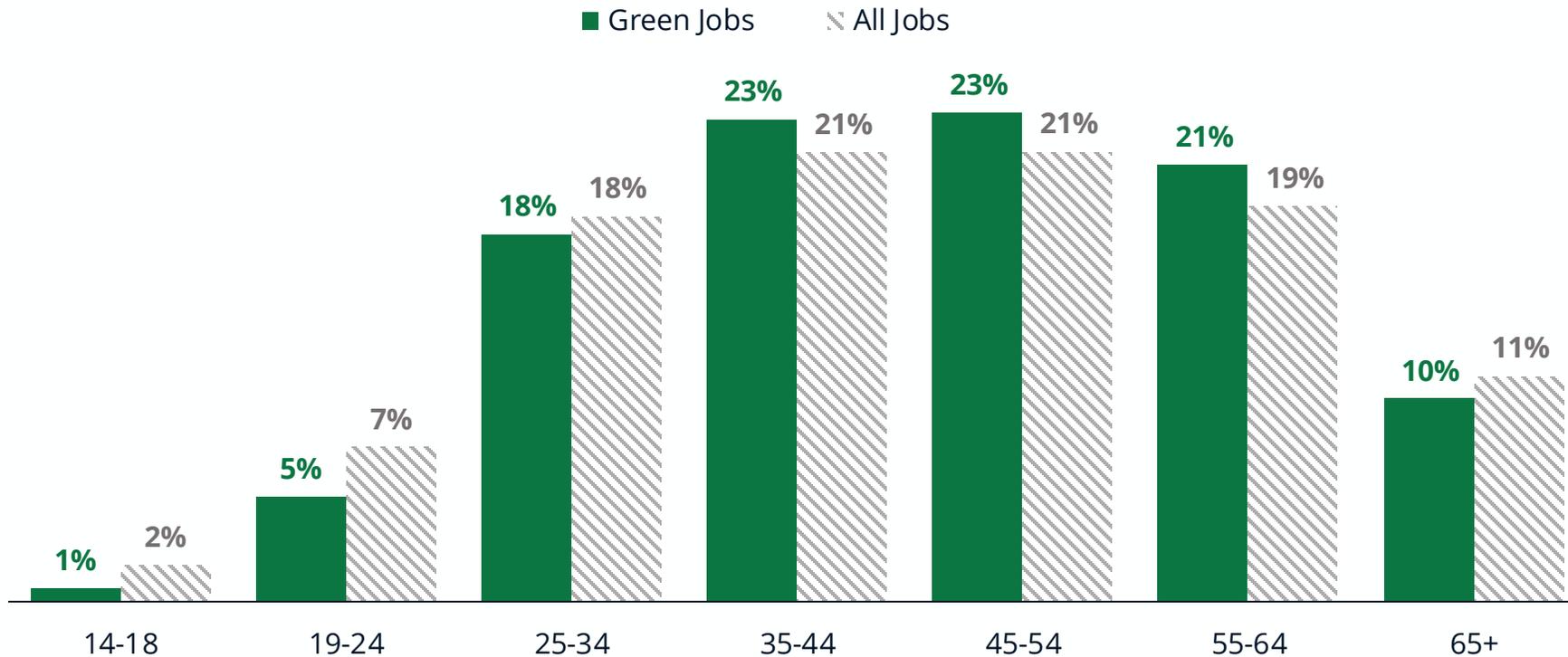
### Green Jobs Average Annual Earnings by Gender in Richmond



## GREEN JOB DEMOGRAPHICS | AGE

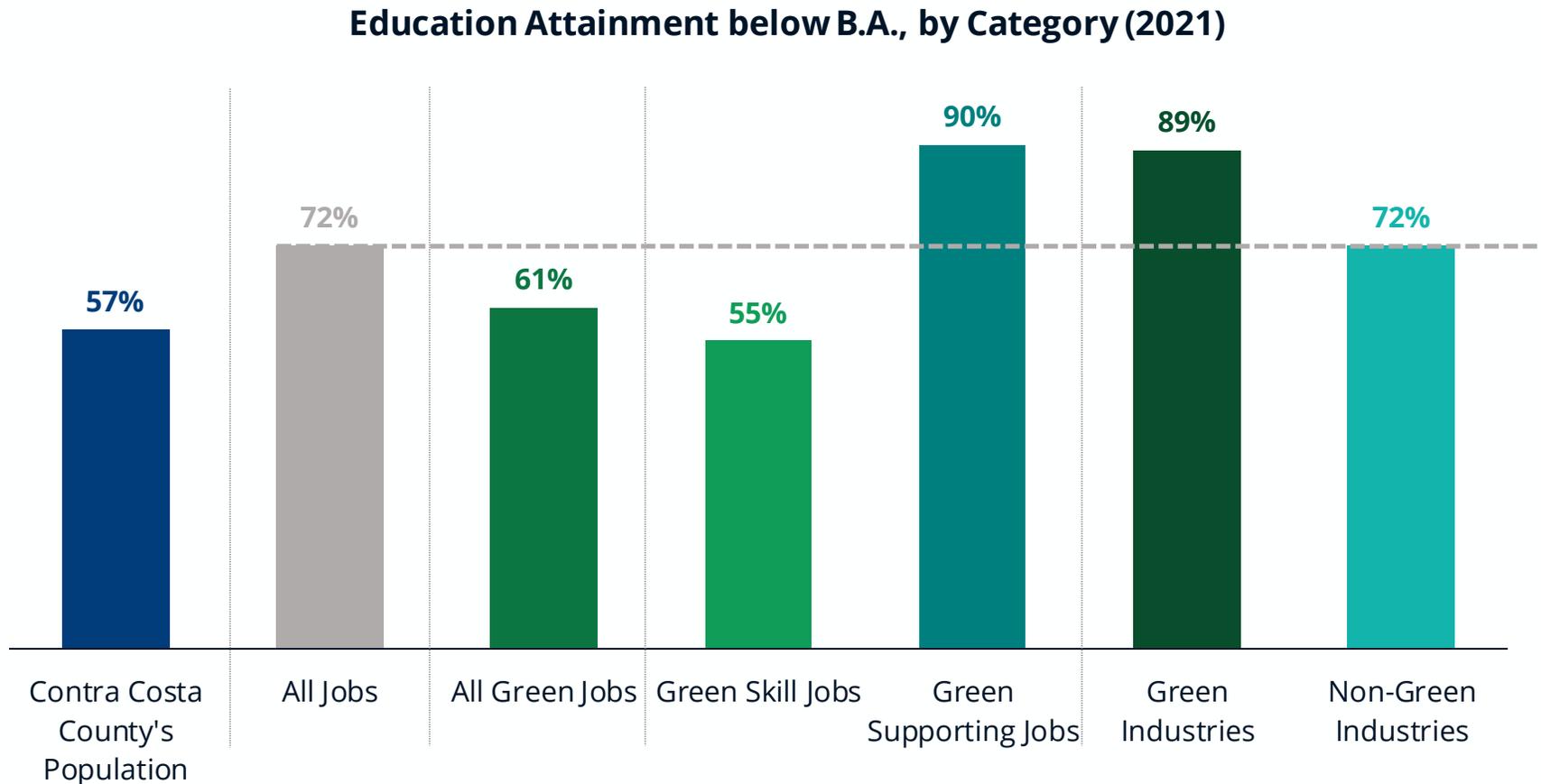
Workers in Green Jobs largely resemble the age distribution of all jobs in Richmond, with slightly more 35- to 64-year-olds in Green Jobs than total jobs.

Age Representation in Richmond, by Category (2021)



## GREEN JOB DEMOGRAPHICS | EDUCATIONAL REQUIREMENT

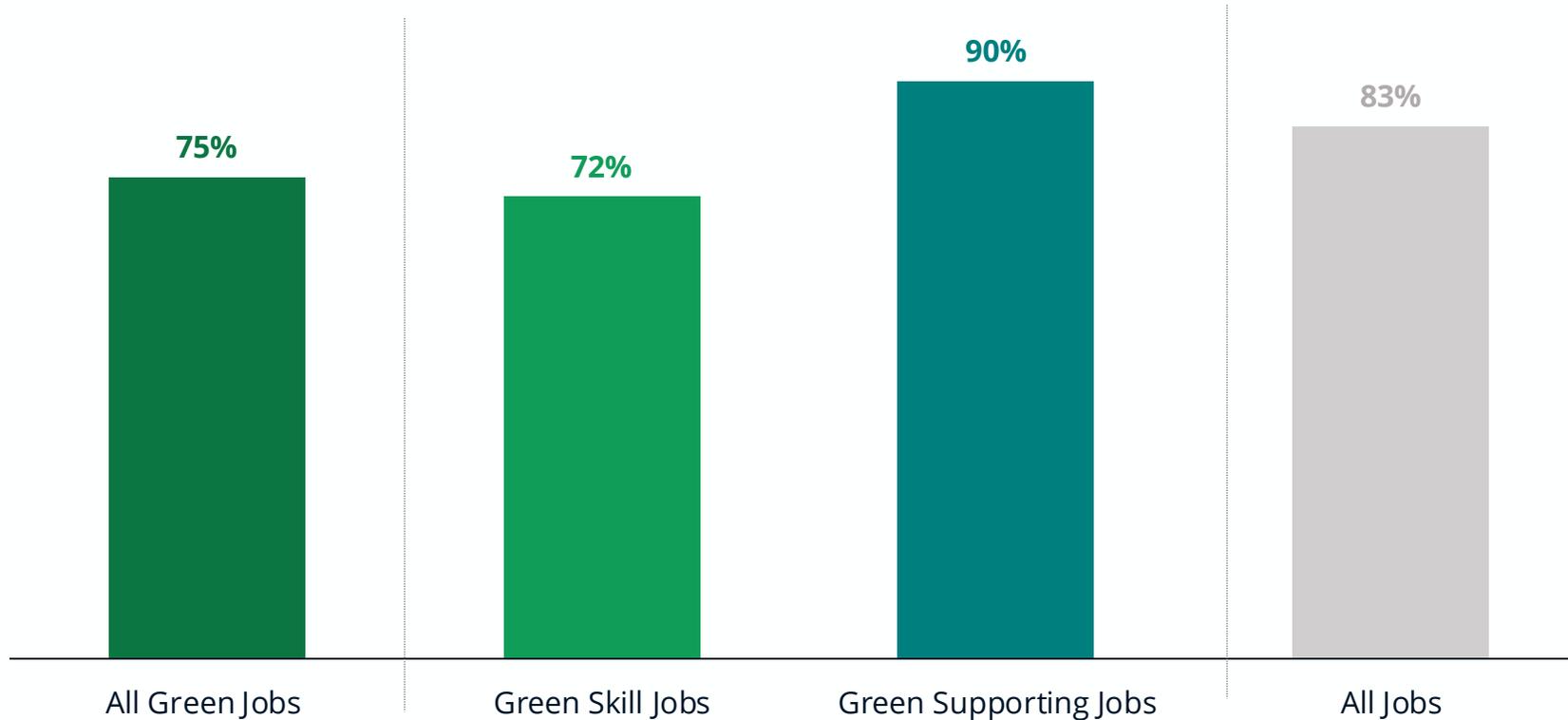
On average, Green Jobs in Richmond require more education than other jobs.



## GREEN JOB DEMOGRAPHICS | EXPERIENCE

Three-quarters of Green Jobs are entry-level positions, slightly fewer than the overall economy. 90% of Green Supporting Jobs do not require any previous work experience.

Percent of Jobs in Richmond that are Entry-level, by Category (2021)



## Key Takeaways

- 1 The racial and ethnic breakdown of Green Jobs is similar to that of the overall worker population in Contra Costa County.
- 2 Green industries tend to be more diverse than non-green industries, with significantly higher representation of Black and Hispanic workers, though slightly lower Asian representation.
- 3 Although wages in Green Jobs rose faster for non-white workers from 2010 to 2021 than for white workers, Black and Hispanic workers still earn \$14,100 less per year than white workers.
- 4 Half of Richmond's workforce is female, but less than one-third of its Green Jobs are women.
- 5 Among Green Jobs, there is a \$4,000 pay gap between men and women, though it was almost 1.5 times as large in 2010.

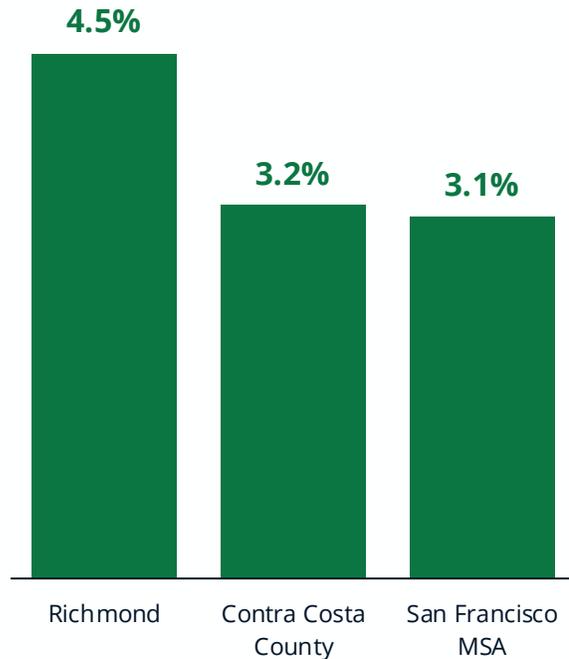
# RICHMOND'S

# GREEN JOB TRENDS

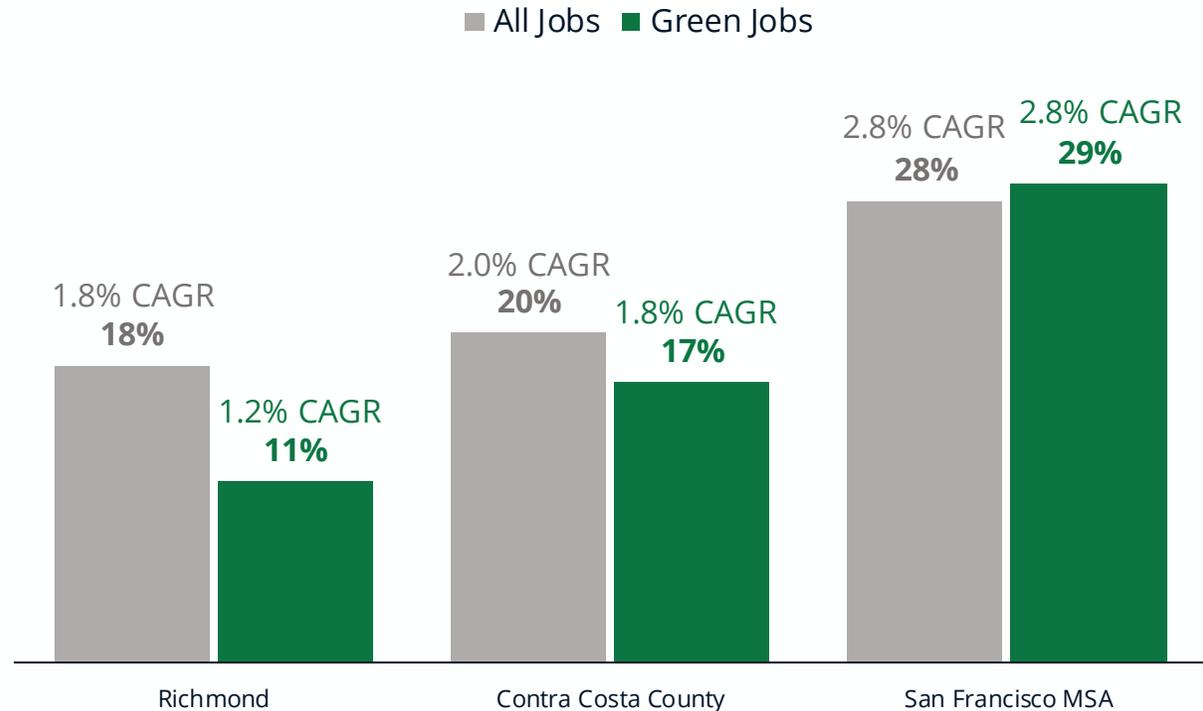
## GREEN JOBS | COMPARATIVE GROWTH TRENDS

Green Jobs make up a greater share of jobs in Richmond than in the County and the MSA. However, between 2010-2019, Green Job growth in Richmond lagged the overall job growth, while in the County and the MSA, Green Jobs grew almost at par with overall jobs.

### Share of Green Jobs in Entire Workforce, by Region (2021)



### Jobs Growth, by Region (2010-2019)

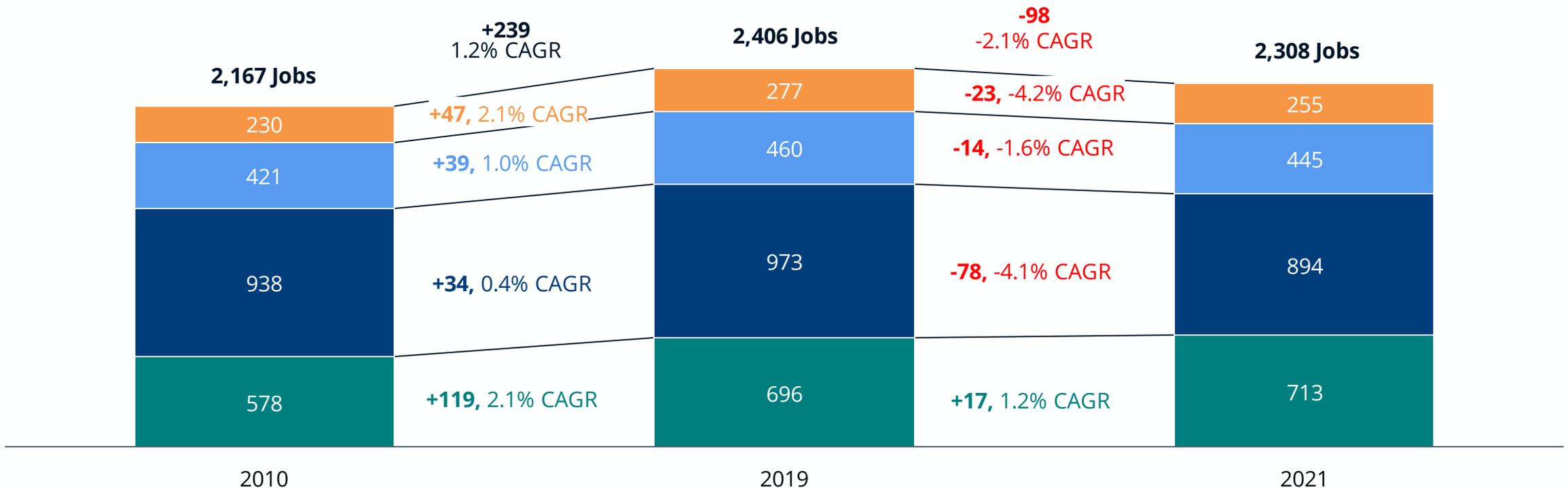


## GREEN JOB TRENDS

Green Jobs in Office, Management, and Operations have been the fastest growing, experiencing growth even during the COVID-19 pandemic. Production, Construction, and Transportation Green Jobs were most severely affected during the pandemic.

**Richmond Green Jobs Growth by Occupation Group (2010-2021)**

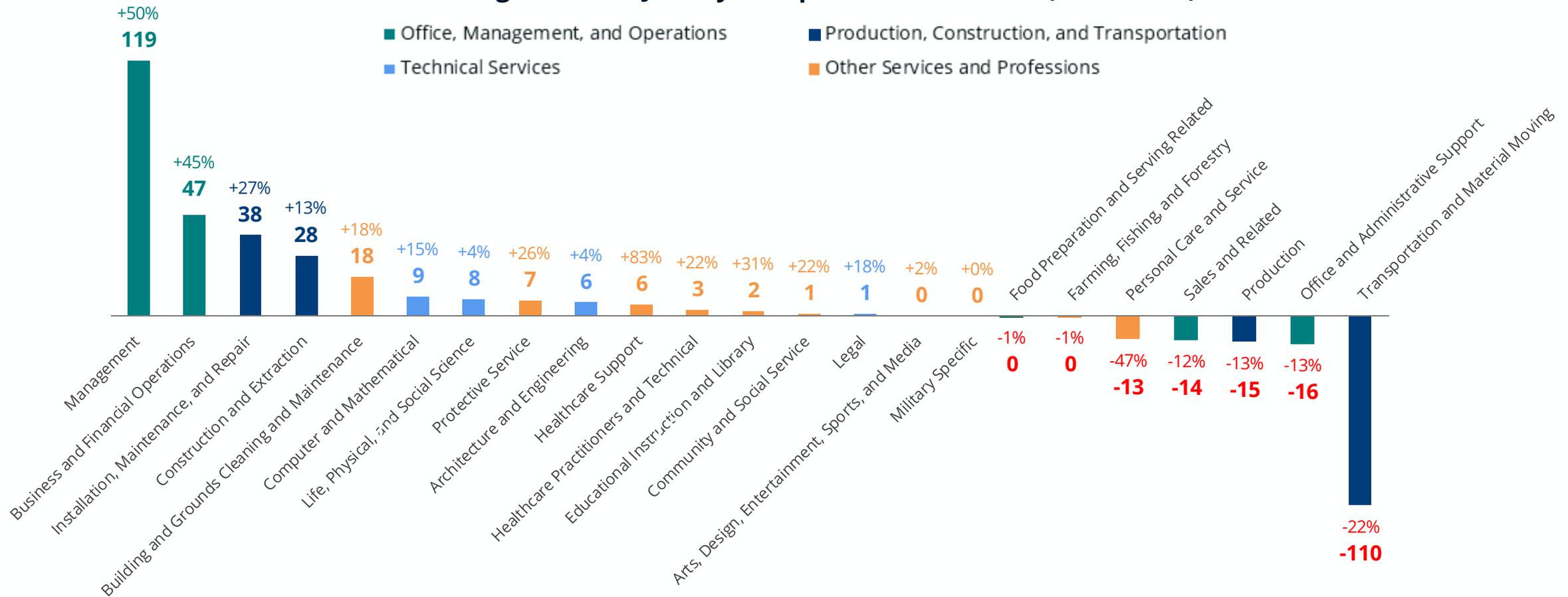
■ Office, Management, and Operations ■ Production, Construction, and Transportation ■ Technical Services ■ Other Services and Professions



## GREEN JOB TRENDS

Management occupations are the fastest growing in terms of Green Jobs, followed by Business occupations. At the same time, Green Jobs in Transportation and Material Moving have declined by the greatest number in the past decade.

Change in Green Jobs by Occupation in Richmond (2010 - 2021)



## Key Takeaways

- 1 In Richmond, Green Jobs grew at 1.2% per year from 2010 through 2019, a growth rate 50% *slower* than that of jobs overall.
- 2 In that period, green Office, Management, and Operations jobs grew faster than jobs in other occupations, comprising almost 50% of local Green Job growth.
- 3 Between 2019-2021, Green Jobs in Richmond showed less resilience compared to the County and the MSA. In Richmond, Green Jobs dipped by a slightly larger share compared to all jobs.

RICHMOND'S

# GREEN JOB BUDGET ANALYSIS

## MUNICIPAL BUDGET ANALYSIS | OPERATING BUDGET

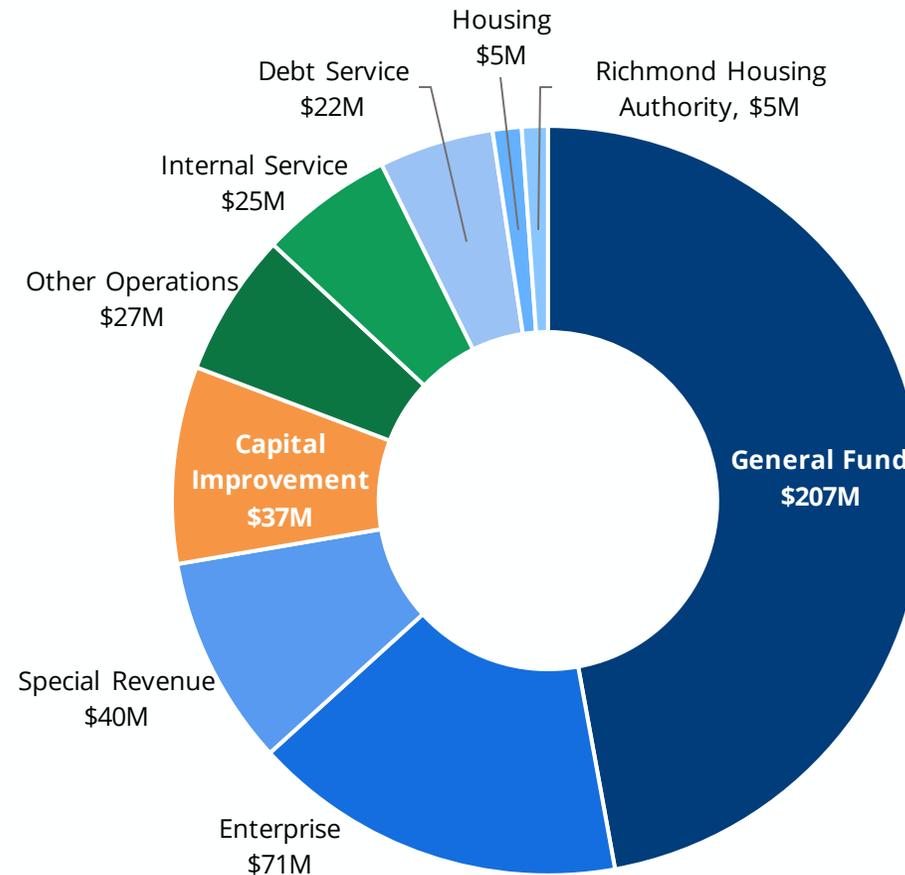
For FY22-23, Richmond's total operating budget is just over \$438M. This analysis focuses on the General Fund, which makes up nearly half of the operating budget, as General Fund spending is relatively flexible compared to funds for specific uses.

Within city budgets, the General Fund is a key source of discretionary funding. With \$207M total, the City staff and City Council can make requests for how the funds are allocated year over year.

For instance, in FY22-23, the City Council allocated over \$1.5M in funds to the following programs: Housing First Framework (\$425K), founding the Public Bank East Bay (\$750K), Reparations, Equity, and Inclusion Implementation (\$250K), a Literacy Fair (\$5K), and Short-Term Emergency Housing Interventions (\$100K).

Most other revenue sources are allocated more strictly. The total Non-General Fund budget totals nearly \$232M and "includes funds dedicated to several programs and services that require tracking of expenditures in specific funds", for instance, debt service and enterprise funds.

City of Richmond Total Revenue by Fund (FY22-23)



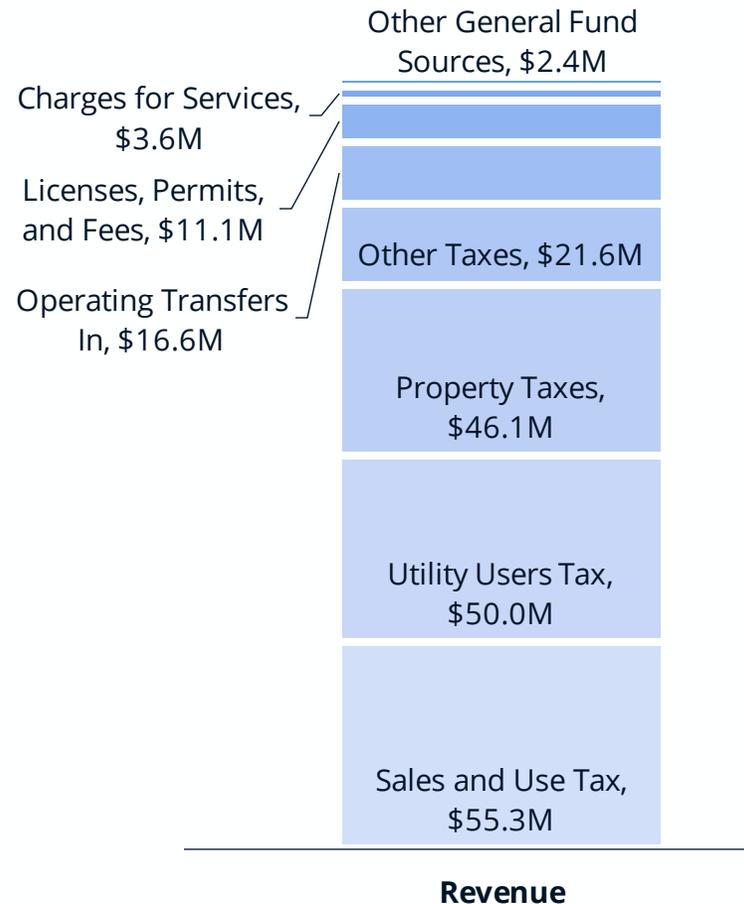
## MUNICIPAL BUDGET ANALYSIS | OPERATING BUDGET

General fund revenues come from a mix of local taxes, with property, utility, and sales and use taxes each comprising about 25% of total revenue. The utility tax rate is high compared to peers', which could incentivize conservation but also burden lower-income taxpayers.

Within a balanced general fund budget, the City of Richmond's revenue sources are fairly typical of California cities, with the majority of revenue coming from Sales and Use Tax receipts and Property Tax receipts.

However, the City of Richmond's Utility Users Tax rate is much higher than other cities in California. The City of Richmond taxes at 10% on electricity and gas, 9% on telecommunications, and 9.5% on prepaid wireless (typically, utility user tax falls in the 4% to 6% range).

Revenue from utilities is a significant part of the City budget, showing a connection to Green Jobs in Richmond.

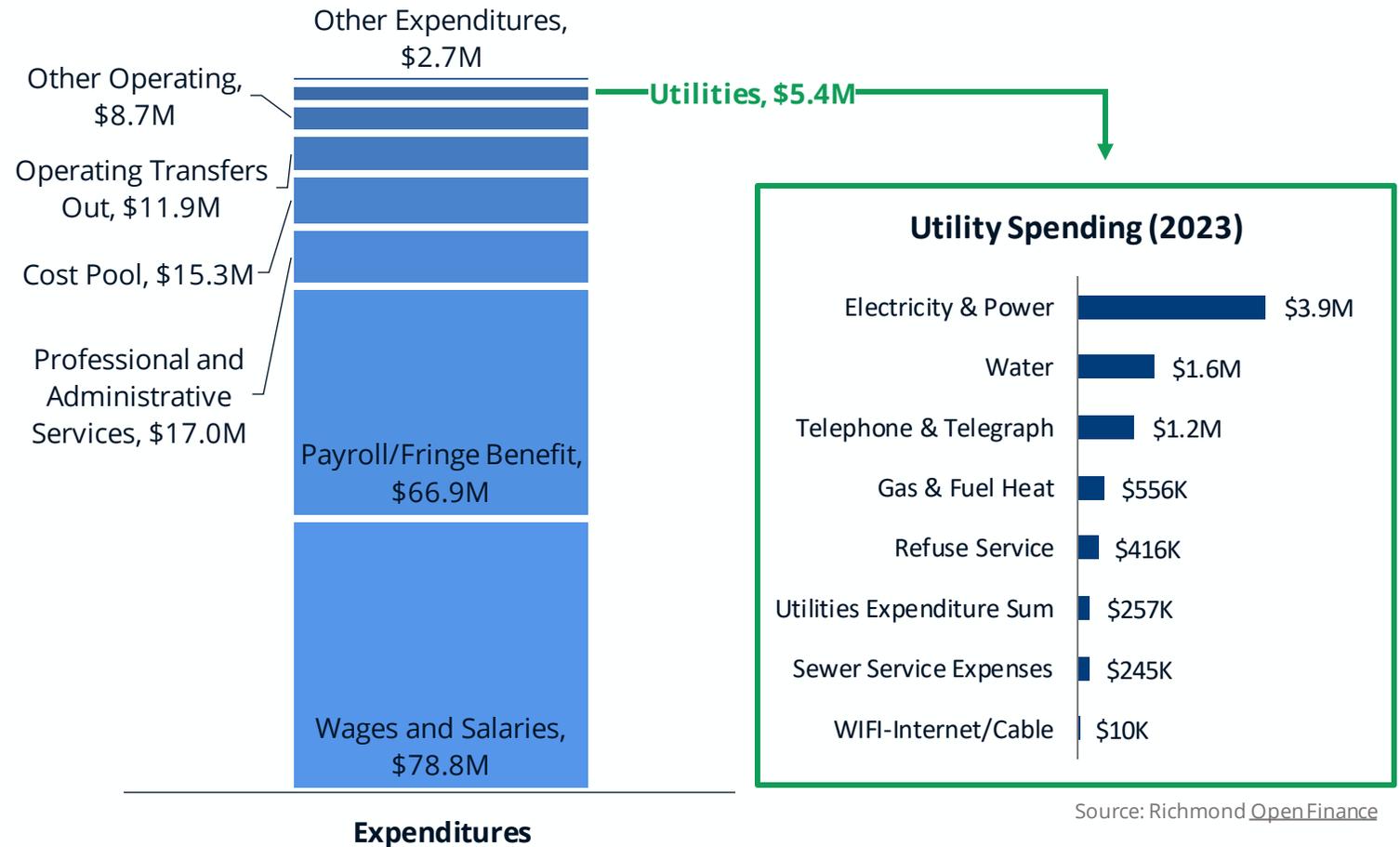


## MUNICIPAL BUDGET ANALYSIS | OPERATING BUDGET

Over 70% of General Fund expenses go to staff wages, salaries, and benefits. Of interest to the Green-Blue New Deal, the City spends \$5.4 million on utilities, most of which is for electricity.

City spending on utilities is primarily in green sectors like electricity and water, as opposed to non-renewable sources like gas and fuel. By increasing the electrification of City assets, it can continue to drive down spending on non-renewable energy. This may support Green Jobs in construction and retrofits, maintenance and upkeep, and even monitoring and administration.

*Note: The utility spending budget at right totals \$8.1M, as it includes non-general fund sources.*



Source: Richmond [OpenFinance](#)

## MUNICIPAL BUDGET ANALYSIS | CAPITAL IMPROVEMENT PROJECTS

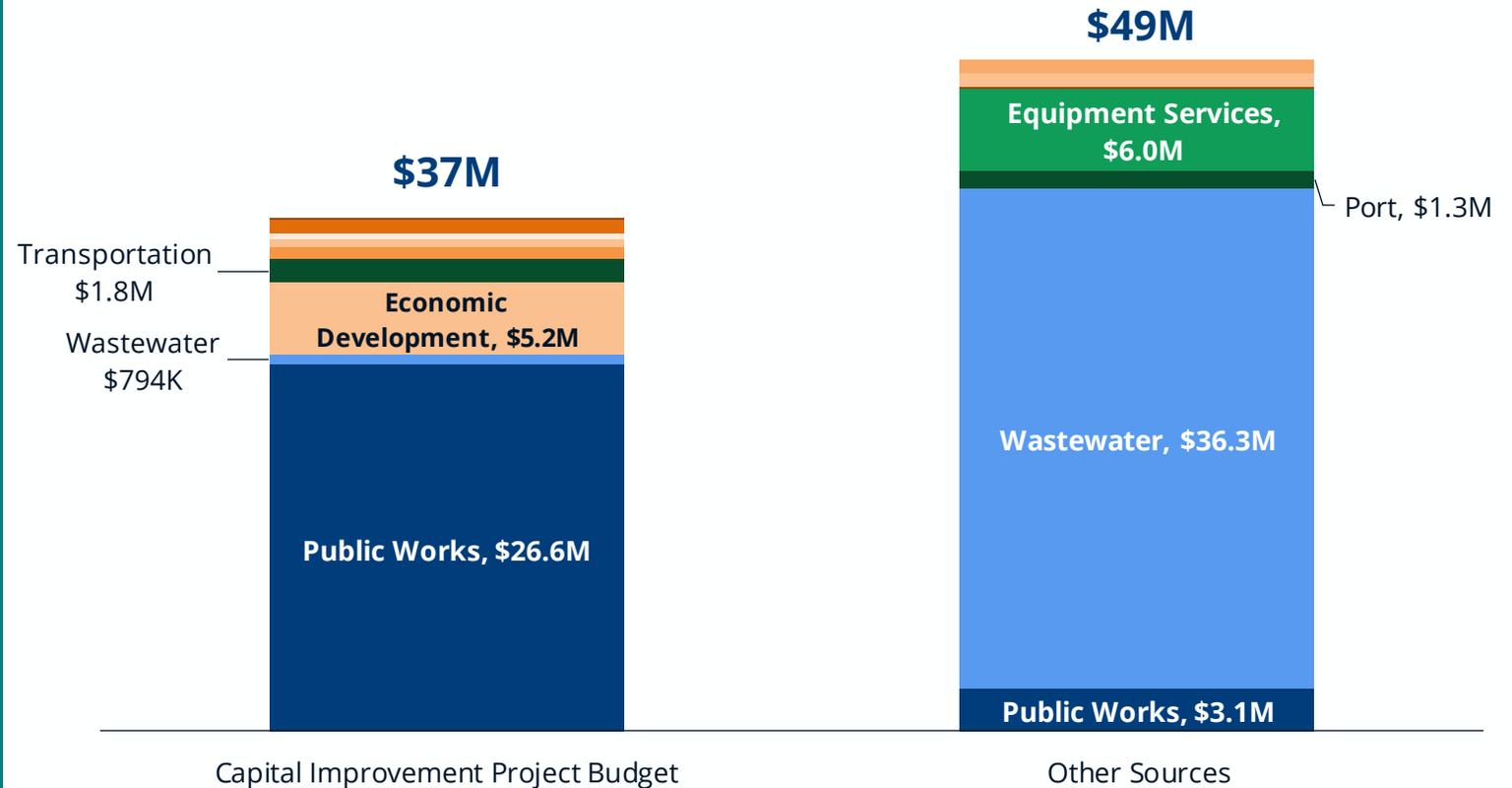
The FY22-23 operating budget includes \$37 million in capital expenditures; beyond the operating budget, an additional \$49M is allocated in capital improvements, bringing the total allocation to \$85M.

This analysis additionally includes an overview of relevant Capital Improvement Projects (CIP), both for the current fiscal year (as shown at right) and in future projections. In departments or divisions related to Green Jobs, CIP investments show opportunities to support job growth in Richmond.

CIP funds come from a series of different revenue sources. Those included in the annual operating budget include Gas Tax, Measure J, Outside Grants, Impact Fees, and others. Additional funding, including revenue from the Enterprise Fund, Marina, Wastewater, ARPA, and other, are noted separately at right.

Departments with spending relevant to Green Jobs are highlighted in green and blue. As seen at right, the vast majority of the funds in the upcoming year will go towards various Public Works projects, described in further detail on the following pages. Green Jobs opportunities may also readily available in Transportation, the Port, and Economic Development.

### FY22-23 Capital Improvement Projects by Source



Note: This excludes \$7,315,055 for Port Operations, \$23,212,632 for Wastewater Operations, \$1,155,168 for KCRT operations, \$9,486,735 for ECIA Operations, \$123,842 for Urban Forestry, \$950,000 for Other Operations, and \$293,593 for Marina Operations. These are not capital line items, though they are included in the Capital Improvement Projects section within the CIP.

## MUNICIPAL BUDGET ANALYSIS | CAPITAL IMPROVEMENT PROJECTS

The Public Works Department maintains much of the City’s infrastructure, including its roads and building, thus advancing the City’s climate goals and supporting Green Job creation.

The Department of Public Works contains many Divisions responsible for various aspects of City assets: Abatement, Parks and Landscape Maintenance, Engineering and Capital Improvement Projects, and Fleet Maintenance.

Within the upcoming CIP, planned improvements to green infrastructure, including parks and trails, help support environmental resilience. Other traffic improvements, including the 13<sup>th</sup> Street Complete Street project, help create and improve walking and biking infrastructure.

Fiscal Year	2021-22	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	Five Year Total
	<i>Adopted</i>	<i>Actual</i>	<i>Adopted</i>	<i>Proposed</i>				
13th Street Complete Street	\$1.4M	\$0.1M	\$0.8M	\$3M				\$3.8M
American Rescue Plan Act (ARPA) Improvements*	\$2M	\$0M	\$1.8M					\$0.9M
Street Paving	\$5.3M	\$2.4M	\$4.9M	\$4.8M	\$4.9M	\$4.9M	\$5M	\$24.5M
Traffic Safety Improvements	\$11.9M	\$4.8M	\$4.2M	\$260K	\$260K	\$260K	\$260K	\$5.3M
Greenway Improvements	\$0.4M	\$0.1M	\$0.1M					\$0.1M
Building Improvements	\$1.1M	\$0.1M	\$1M					\$1M
Park Improvements	\$11.7M	\$0.8M	\$9.9M					\$9.9M
SF Bay Trail Improvements	\$1.1M	\$10K	\$1M					\$1M
Other	\$11M	\$1.9M	\$5.9M	\$1M	\$1M	\$1M	\$1M	\$11M
<b>Total</b>	<b>\$46M</b>	<b>\$10.2M</b>	<b>\$29.7M*</b>	<b>\$9M</b>	<b>\$6.2M</b>	<b>\$6.2M</b>	<b>\$6.3M</b>	<b>\$57.5M</b>

Note: Rows above are summed categorizations of similar project types.  
 \* ARPA-funded projects are included in “Other Sources” in prior slide.

## MUNICIPAL BUDGET ANALYSIS | CAPITAL IMPROVEMENT PROJECTS

The Water Resources Recovery Division is planning nearly \$48.1M in public improvement projects, which can support Green Jobs in environmental compliance and water safety.

The Water Resource Recovery Division, within the Public Works Department, is responsible for the city's sewer collection system and wastewater treatment. The Division is a heavily resourced division due to the need for frequent upkeep and replacement of assets like sewers and sanitation. Most projects in the Division are compulsory and help the City avoid sanitary sewer overflows.

Green Jobs can both help keep water systems safe and improve the efficiency of operations. For instance, one improvement at the Wastewater Treatment Plant (WWTP) is the installation of a unit to reuse the digester gas and provide power for the Wastewater Treatment Plant, thus reducing energy consumption.

Water Resource Recovery can increasingly use "green infrastructure" or more ecologically conscious techniques as well. At Rheem Creek Watershed, the Flood Risk Reduction project is designed to use environmental restoration to stabilize the channel and improve creek habitat.

Fiscal Year	2021-22	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	Five Year Total
	<i>Adopted</i>	<i>Actual</i>	<i>Adopted</i>	<i>Proposed</i>				
Wastewater Treatment Plant (WWTP) Upgrades	\$43.2M	\$12.9M	\$25.7M					\$25.7M
Routine Sewer Maintenance	\$6.2M	\$2.1M	\$4.1M	\$2.8M	\$2.8M	\$2.8M	\$2.8M	\$15.1M
Sewer Capacity Improvements	\$14.6M	\$3.9M	\$5.2M					\$5.2M
Flood Risk Reduction Rheem Creek Watershed			\$1.6M					\$1.6M
Other	\$1.6M		\$515K					\$515K
<b>Total</b>	<b>\$65.7M</b>	<b>\$18.81M</b>	<b>\$37.1M</b>	<b>\$2.75M</b>	<b>\$2.75M</b>	<b>\$2.75M</b>	<b>\$2.75M</b>	<b>\$48.1M</b>

Note: Rows above are summed categorizations of similar project types.

## MUNICIPAL BUDGET ANALYSIS | CAPITAL IMPROVEMENT PROJECTS

Planned improvements at the Port, including berth electrification, show areas for Green Jobs in both installation and maintenance of electrification infrastructure.

At the Port, major improvements are planned for the Point Potrero Marine Terminal (PPMT) in order to meet updated state requirements.

Over the upcoming fiscal year, \$1.2M will be spent on upgrades and improvements. Most significantly, \$750K will be used to “install shore power system consistent with the requirements of the California Air Resources Board. This project will install electrical substation, conduits, conductors, and plug-in equipment at the PPMT berth.”

However, no planned investments in electrification maintenance are noted for upcoming fiscal years. Green Jobs will likely be needed for operation and maintenance of these electrical systems, including monitoring and updating the equipment.

Fiscal Year	2021-22	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	Five Year Total
	<i>Adopted</i>	<i>Actual</i>	<i>Adopted</i>	<i>Proposed</i>				
PPMT Berth Electrification			\$750K					\$750K
PPMT Repairs and General Upgrades	\$151K	\$44K	\$400K					\$400K
PPMT Environmental Compliance			\$100K					\$100K
PPMT Electrical Upgrades	\$50K	\$35K						
Terminal 2 Improvements	\$504K	\$4K						
Other	\$139K							
<b>Total</b>	<b>\$844K</b>	<b>\$82K</b>	<b>\$1.25M</b>					<b>\$1.25M</b>

Note: Rows above are summed categorizations of similar project types.

## MUNICIPAL BUDGET ANALYSIS | CAPITAL IMPROVEMENT PROJECTS

Outside grants given to the Transportation Department advance Green Jobs through programs in shared mobility and citywide electric vehicle readiness.

All CIP funding for the Transportation Department fall under FY22-23 and were provided by outside grants. For instance, the California Energy Commission’s (CEC’s) Clean Transportation Program released funds for “projects developed and identified in Phase I, Blueprint Development, of the Electric Vehicle (EV) Ready Communities Challenge.”

Outside funds can continue to supplement Green Jobs, particularly in sectors that are aligned with state and federal priorities like transportation electrification. Many grant funds require some match of local funding; as additional projects seek grant funding, the City should consider holding or proposing funds for matching grants.

	FY2022-23 Adopted
Bike Share Program (Staff Time)	\$52,000
CEC Phase II EV Ready Communities Phase 2	\$554,949
MTC Nystrom Village Hub	\$261,646
On Demand Shuttle	\$900,000
<b>Total</b>	<b>\$1,768,595</b>

## MUNICIPAL BUDGET ANALYSIS | UNFUNDED CAPITAL IMPROVEMENT PROJECTS

In addition to the budgeted projects in the five-year CIP, there are \$242M in unfunded CIP requests. \$193M are proposed to be allocated in the next five years; the remaining \$48M do not yet have a fiscal years assigned and are primarily in the Public Works Department.

Over the next five years, additional projects with opportunities to invest in Green Jobs may come from capital projects that are currently unfunded but with proposed allocation dates.

In the Public Works Department, unfunded requests include upgrades to HVAC, lighting systems, roofs and repairs, and other facility improvements that can help make Richmond’s buildings more environmentally sustainable.

Funds requested in the Library Department and Community Services Department represent similar opportunities – by improving the energy efficiency of Richmond’s assets, the City can create Green Jobs in heating and cooling system repairs while also improving its internal carbon efficiency.

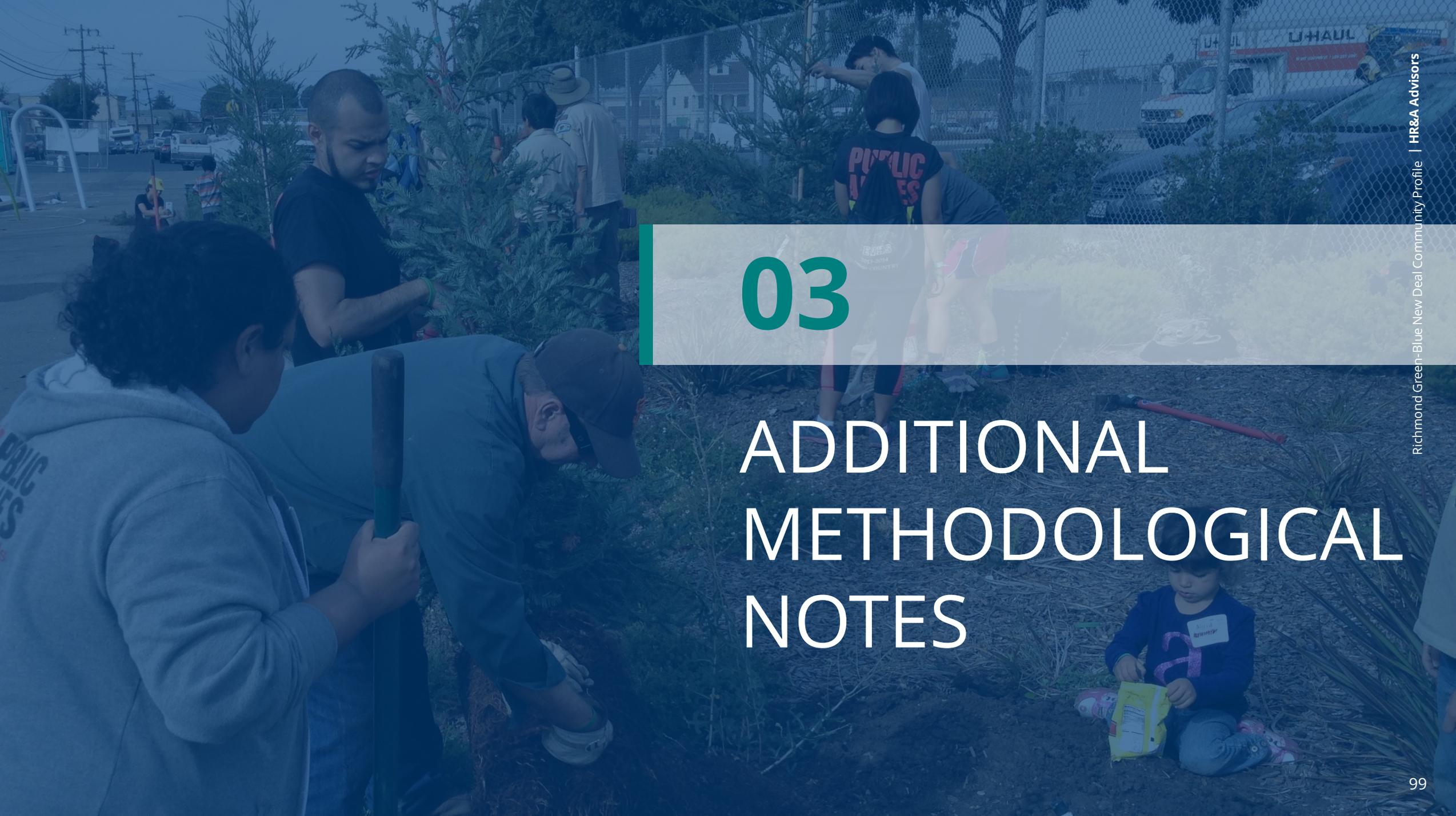
### Capital Unfunded Request FY2022/23 to FY2026/27

	Adopted FY2022-23	Proposed FY2023-24	Proposed FY2024-25	Proposed FY2025-26	Proposed FY2026-27	Fiscal Year Not Yet Assigned	Total
Police Department		\$2M	\$78M				<b>\$80M</b>
Public Works Department		\$4M	\$13M	\$15M	\$1M	\$43M	<b>\$75M</b>
Library Department		\$1M	\$3M	\$24M	\$24M	\$1M	<b>\$52M</b>
Fire Department		\$1M	\$16M	\$1M			<b>\$17M</b>
Information Technology Department		\$3M	\$2M	\$2M	\$1M		<b>\$8M</b>
Community Services Department							
City Attorney Department		\$1M	\$1M	\$0M	\$1M		<b>\$3M</b>
Employment & Training Department		\$0M					<b>\$300K</b>
<b>Total</b>		<b>\$14M</b>	<b>\$113M</b>	<b>\$41M</b>	<b>\$26M</b>	<b>\$48M</b>	<b>\$242M</b>

Note: Rows above are summed categorizations of similar project types.

### Key Takeaways

- 1 The City Council has flexibility to set spending priorities within the \$207M General Fund and could set aside some funds to support Green Job development in Richmond.
- 2 Richmond has planned significant infrastructure investments for the next five years, many of which support environmental resilience and create Green Jobs in both construction and operation of those projects. For example:
  - Improving efficiency of city-owned buildings
  - Maintaining clean water infrastructure
  - Expanding ecological restoration and “green infrastructure” projects like parks and trails
  - Electrifying the Port
  - Installing necessary equipment for electric vehicles
- 3 Many other capital improvement projects remain unfunded, including park and open space restorations, updating the heating and cooling system at libraries, adding lighting to the auditorium stage, and other facility improvements that could achieve environmental benefits.
- 4 City Departments could place greater emphasis on encouraging capital improvement project leaders to seek and secure funds for green projects.



03

# ADDITIONAL METHODOLOGICAL NOTES

## GREEN ECONOMY

Definitions of the green economy and Green Jobs vary across institutions, but all share a focus on environmental sustainability.

### Example Green Economy Definitions

#### *State of California EDD: California's Green Economy*

Generating and storing renewable energy; recycling existing materials; energy efficient product manufacturing; education, compliance, and awareness; natural and sustainable product manufacturing.

#### *United Nations*

A green economy is defined as low carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services.

### Example Green Job Definition

#### *Bureau of Labor Statistics*

Green Jobs are jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources.

Or

Jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources

## BLUE ECONOMY

Blue economy definitions refer to any economic activities that are water/ocean-dependent or to a subset of those activities that are environmentally sustainable or restorative.

### Broad Definitions

#### *European Commission*

All economic activities related to oceans, seas and coasts. It covers a wide range of interlinked established and emerging sectors. United Nations.

#### *The Center for the Blue Economy*

It is now a widely used term around the world with three related but distinct meanings—the overall contribution of the oceans to economies, the need to address the environmental and ecological sustainability of the oceans, and the ocean economy as a growth opportunity for both developed and developing countries.

### Sustainability-related Definitions

#### *World Bank*

The Blue Economy is the economy that depends on the use of oceans and other water resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems.

#### *City of Richmond Resolution 88-21*

Blue Economy is not synonymous with all economic activity that occurs on coastlines and shorelines or any use of water resources, nor simply technological innovation involving water-based industries. The Blue Economy represents a narrower band of economic activity that is restorative to ocean and shoreline ecosystems and promotes broad-based economic opportunity including “blue jobs”

## GREEN-BLUE ECONOMY

For this Green-Blue New Deal study, the green-blue economy includes the entire green economy, with a special focus on the subset that is water-dependent or “green-blue”.

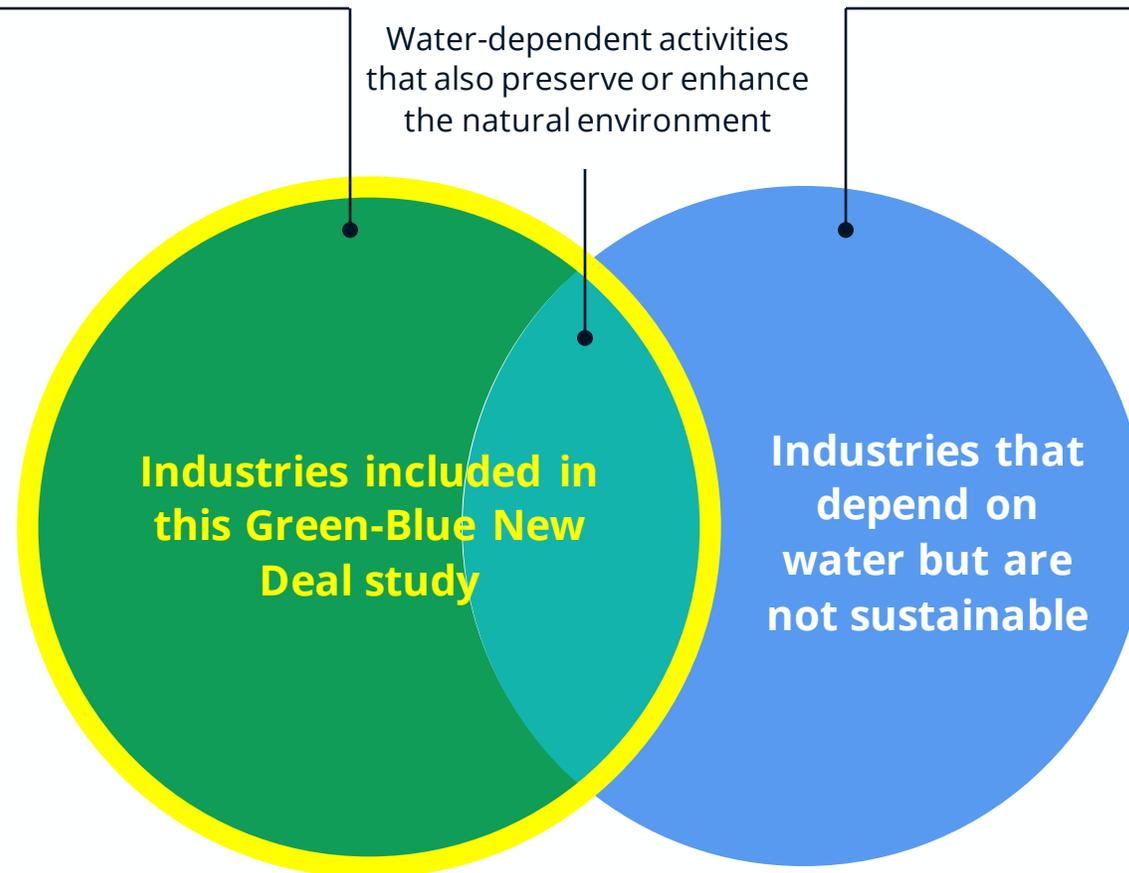
### Green Economy

Activities that **contribute to preserving or enhancing the natural environment for current and future generations**

Water-dependent activities that also preserve or enhance the natural environment

### Blue Economy

Any activity that **depends on water** (e.g., fisheries, goods shipping, offshore drilling).



## CATEGORIZATION

Green jobs are both jobs at green businesses and sustainability-focused jobs in non-green industries.

**Businesses**  
Classified by  
**Industry**

### GROUPINGS

Business establishments are grouped into industries based on the goods and services they produce and the methods used to produce them.

### EXAMPLES



### CLASSIFICATION SYSTEM

North American Industry Classification System (NAICS)

**Workers**  
Classified by  
**Occupation**

Workers are grouped into occupations based on job duties and skills.



Standard Occupational Classification (SOC) System

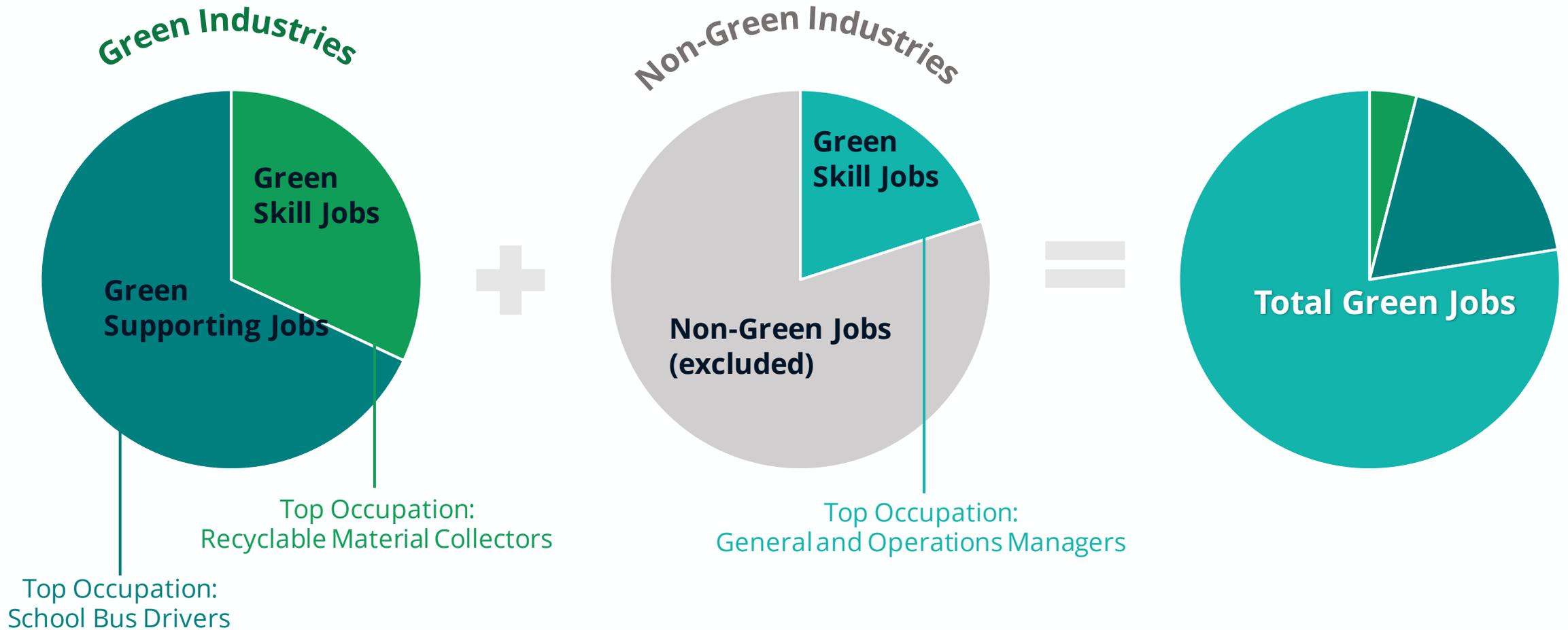
## PRECEDENTS & DATASETS

HR&A reviewed top precedents and data sources related to the quantification of Green Jobs.

	Study			Dataset		
	Green Goods and Services (GGS)	U.S. Energy & Employment Jobs Report (USEER)	Green and Growing: New York's Sustainable Economy	Green Jobs Now	Quarterly Census of Employment and Wages (QCEW)	Jobs Postings
Publisher	Bureau of Labor Statistics (BLS)	U.S. Department of Energy	New York State Comptroller	Working Nation (ongoing)	Bureau of Labor Statistics (BLS), compiled by Lightcast	Lightcast, by scraping 45,000 websites worldwide
Focus	Revenue and employment driven by green goods and services	Energy sector jobs	Green jobs in New York state	Creating a holistic Green Jobs definition	Employment numbers and trends	Job postings mentioning particular skills
Strength	Most comprehensive survey to date on green economy	Comprehensive energy sector accounting on industry level	Specificity in Green Occupations by using O*NET SOC	Exhaustive comparison of different studies and their estimates	Most comprehensive employment data with ZIP level granularity	Machine learning based categorization of Green Skills
Limitation	Discontinued after 2011	Limited to energy sector	Makes problematic assumptions about distribution of sub-occupations	Ongoing effort; industries and occupations lack granularity	No specific categorization for Green Jobs	Limited insight on current jobs; proprietary data and skill coding methodology

## METHODOLOGY OVERVIEW

Drawing on available datasets, we developed a methodology to deliver actionable results for the Richmond's workforce development plan, with a focus on Green Skills.



## METHODOLOGY OVERVIEW

Lightcast (formerly EMSI) identifies over 30,000 skills sought by employers, of which over 100 are considered “green.”

Lightcast Green Skill Category	Example Green Skills
<b>Conservation</b>	Marine Conservation, Conservation Biology, Wildlife Conservation
<b>Education</b>	Ecology, Environmental Education, Sustainable Development
<b>Energy Efficiency</b>	Certified Energy Manager, Corporate Sustainability, Green Building
<b>Environment Health And Safety</b>	Air Quality, ISO 1400 Series, Environmental Tests,
<b>Regulatory</b>	Environmental Laws, Environmental Impact Assessments
<b>Renewable Energy</b>	NABCEP Certified Energy Practitioner, Solar Energy, Wind Farming
<b>Science</b>	Climate Variability And Change, Environmental Chemistry
<b>Technical</b>	Environment Management, Geotechnical Engineering
<b>Waste</b>	Recycling, Waste Management, Materials Recovery

## METHODOLOGY OVERVIEW

This study uses the best available data on jobs and job postings in Richmond to estimate the number of Green Jobs and characterize worker demographics.

### GREEN SKILL JOBS

1. Using historic job postings on Lightcast<sup>1</sup>, first determine the percentage of jobs in each occupation that require Green Skills.
2. Pro-rate each occupation's share of Green Skill Jobs by applying the green skill requirement percentage to the total number of jobs in that occupation.



### GREEN SUPPORTING JOBS

1. Using Lightcast<sup>1</sup>, calculate total jobs in green industries, based on a national Bureau of Labor Statistics (BLS) survey on the percent of each industry's revenue derived from green activities.
2. Subtract the Green Skill Jobs in green industries previously calculated to estimate the number of jobs that are in green industries but do not require Green Skills.



3. Categorize Green Skill Jobs and Green Supporting Jobs to enable more nuanced analysis along dimensions including skills, occupation groups, major companies, and demographics.



<sup>1</sup>HR&A is relying on Lightcast (formerly EMSI), a third-party labor data aggregation firm, to gather the share of job postings in various industries with green skills as a share of total job postings over the last 3-5 years. Lightcast has a Green Skills category established through benchmarking popular studies on green jobs, which can be modified if needed to suit our definitions.