



Green Economy Overview for K-12 Educators

Resources developed by San Mateo County Office of Education's (SMCOE)

[Environmental Literacy and Sustainability Initiative \(ELSI\)](#) and College & Career Readiness • Last updated March 2021

PURPOSE AND OVERVIEW

The purpose of this document is to show how the “business case for sustainability” has impacted the overall economy, and to demonstrate the shift that is taking place in each sector towards green operations and practices, otherwise known as, “the green economy”. The document begins with a definition of the green economy, then makes a case for why K-12 educators need to be integrating careers more directly into curriculum and instruction (and how to include sustainability along the way), and then analyzes shifts in 15 different sectors towards sustainability.

PART I: DEFINING THE GREEN ECONOMY

The term “Green Economy” has been used in many different ways, and includes many different examples. It generally includes themes related to zero carbon, resource efficiency, circular economy and zero waste practices, and a socially inclusive/responsible economy. A simple way to think about the *Green Economy* is that it is everything we do in the regular economy, but with the integration of environmentally sustainable policies, practices, and design principles.

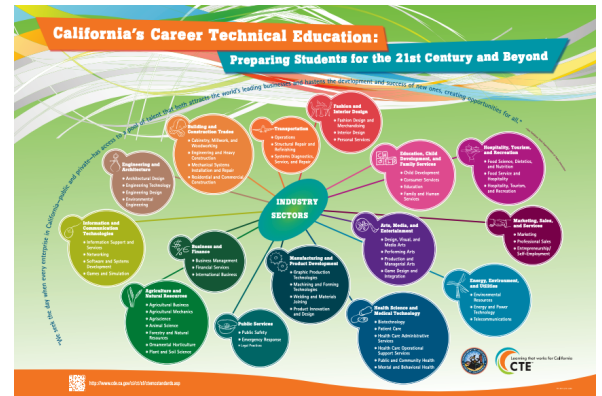
According to the [U.S. Department of Labor's Occupational Information Network](#) (2010), it is useful to breakdown the different types of green economy jobs into the following three categories:

- **Changing Skill Green Occupations:** These fields are adding new tasks or specialty areas because of the demand for green goods and services.
- **Higher Demand Green Occupations:** In these fields, the job duties are not changing but the occupation itself will probably grow because of the increased demand for green goods and services.
- **New Green Occupations:** These are jobs that are emerging because of green and environmental sustainability trends in various industries and sectors.

PART II: IMPERATIVE FOR EDUCATORS

The purpose of K-12 education is to prepare students for their college and career choices, and for the world in which they live. The local and global challenges of our time necessitate that K-12 educators integrate career and environmental education with K-12 programs. A significant amount of leadership for environmental sustainability and climate action has come from the business and industry sectors, which have begun the transition towards environmentally sustainable and socially responsible practices. As such, to better prepare our students for the workforce, K-12 curricula should include discussions on how these sectors have adopted a “green” mindset, and incorporate instruction that promotes these same values and practices. Schools play an important role in recruiting a critical mass of humanity to engage with a sustainable paradigm shift, and in preparing the workforce of tomorrow to be able to problem-solve and operate with a sustainable mindset.

In California Career Technical Education (CTE) there are [58 pathways grouped within 15 industry sectors](#). Each sector's set of [Model Curriculum Standards](#) incorporates the [Standards for Career Ready Practice](#) that describe the fundamental knowledge and skills that students need to prepare for the transition to postsecondary education, career training, or the workforce. Within these sectors and associated pathways there are several explicit references to environmental sustainability and social responsibility; for example, all pathways within the Energy, Environment, and Utilities (EEU) industry sector, the Environmental Engineering pathway within the Engineering and Architecture Sector, and the Forestry and Natural Resources pathway within the Agriculture and Natural Resources industry sector. While these references are a good starting point, it is critical that CTE programs reinforce the environmentally-focused CA Standards for Career Ready Practices by considering how the “green economy” is redefining the many careers, jobs, trades, and sectors outlined in these pathways.



<u>Agriculture and Natural Resources</u>	<u>Energy, Environment, and Utilities</u>	<u>Information and Communication Technologies</u>
<u>Arts, Media, and Entertainment</u>	<u>Engineering and Architecture</u>	<u>Manufacturing and Product Development</u>
<u>Building and Construction Trades</u>	<u>Fashion and Interior Design</u>	<u>Marketing Sales and Service</u>
<u>Business and Finance</u>	<u>Health Science and Medical Technology</u>	<u>Public Services</u>
<u>Education, Child Development and Family Services</u>	<u>Hospitality, Tourism, and Recreation</u>	<u>Transportation</u>

Students engage in an instructional program that integrates academic and technical preparation and focuses on career awareness, career exploration, and skill preparation in seven pathways, which emphasize real-world, occupationally-relevant experiences of significant scope and depth in Agricultural Business, Agricultural Mechanics, Agriscience, Animal Science, Forestry and Natural Resources, Ornamental Horticulture, and Plant and Soil Science. Integral components of classroom and laboratory instruction, supervised agricultural experience projects, and leadership and interpersonal skills development prepare students for continued training, advanced educational opportunities, or entry to a career.

Green Job Examples in this Sector	Agricultural Inspector, Agricultural Technician, Buyers and Purchasing Agents, Farm Products, Farmers and Ranchers, First-Line Supervisors of Agricultural Crop and Horticultural Workers, General and Operations Managers, Landscape Architect, Precision Agriculture Technician, Fish and Game Warden See: https://www.careeronestop.org/GreenCareers/ExploreGreenCareers/agriculture-forestry.aspx
Relevant Concepts and Statistics, Policy, for Sustainability	Organic Agriculture refers to farming practices that encourage soil and water conservation, reduce pollution, and do not use conventional and synthetic methods to fertilize or control weeds and insects. According to the U.S. Department of Agriculture, consumer demand for organically produced goods continues to show double-digit growth (20% annual growth since 1990), with organic sales accounting for over 4 percent of total U.S. food sales. Additionally, Organic products are now available in nearly 20,000 natural food stores and nearly 3 out of 4 conventional grocery stores (2021). • 4% of all Agriculture in California is organic and 4% of total U.S. food sales are organics • Double-Digit % growth in demand for organics • 20+% growth annually in organic food retail sales since 1990 Fair Trade is a way of buying and selling products that makes certain that the people who produce the goods receive fair treatment. • 30% increase in Fair Trade produce sales volume in 2018 • 63% of consumers recognize this socially responsible seal in US markets Regenerative Agriculture describes practices that reverse climate change by rebuilding soil organic matter and restoring degraded soil biodiversity – resulting in both carbon drawdown and improving the water cycle. • 4% of U.S. cropland uses cover crops, a restorative agriculture practice • 1% of meat, dairy, and egg production is not in a factory farm • 264% growth in 9 weeks of 2020 in the vegan meat industry Farm to Fork is a framework for eating locally by aiming to only consume, distribute, and purchase food from within a 100-mile radius of your location. • 42% of U.S. Schools have a farm to fork program • 68% of global consumers prefer local vegetables Forestry and Natural Resources is working to grow, cultivate, conserve, manage, and protect healthy forest ecosystems. • 4.9% expected increase in forester jobs between 2016 and 2026 • 237,064,332 recreation visits in 2020 alone

Arts, Media, and Entertainment

New technologies are constantly reshaping the boundaries and skill sets of many arts career pathways. Consequently, core arts-sector occupations demand constantly varying combinations of artistic imagination, metaphoric representation, symbolic connections, and technical skills. Successful career preparation involves both broad and in-depth academic and technical preparation as well as the cultivation of twenty-first-century skill assets, such as flexibility, problem-solving abilities, and interpersonal skills. Careers in the Arts, Media, and Entertainment sector fall into four general pathways: Design, Visual, and Media Arts; Performing Arts; Production and Managerial Arts; and Game

Design and Integration. Through the manipulation of sight, sound, and motion, those choosing a pathway from this sector reach out in unique ways to enhance the quality of life for those around them.

Green Job Examples in this Sector	Graphic designer , Technical writer , Documentarian, Environmental Journalist , Environmental Artist, Sustainability specialist , social justice curator
Relevant Concepts and Statistics for Sustainability	Environmental Visual Arts are the use of visual media with the theme of the environment woven throughout. Visual arts can be used as an advocacy tool, by bringing in issues such as environmental degradation. • Since the 1960s environmental art in the U.S. has been growing Music and the Environment: There are a number of practices within the music industry that connect to the environment: • Environment and environmentalism as a theme or topic in music: this practice has been growing since post-WWII. • Operations: In addition to being a topic of music, Environmentalism has been increasingly prevalent among artists and the music industry itself. An example is a push for CDs to be packaged in cardboard rather than plastic. Also, many music festivals such as Bonnaroo make significant efforts to be sustainable ◦ 2.4 million single-use water bottles have been eliminated from concerts in North America since 2013 ◦ Billie Eilish Where Do We Go? World Tour will be greened by REVERB ◦ REVERB works with top musicians to educate and engage musicians and their fans to promote environmental sustainability. News and Media that covers, comments on, or calls people to action on climate change or environmental issues or that has a segment of their coverage that is committed to climate action or issues. • 400 news outlets around the world are taking part in the Covering Climate Now initiative • 73% increase in newspaper reporting on climate change • 700% increase in social media commentary on climate action Environmental Film and Television is movies, shows, or media that have an environmental theme throughout or at times, and specifically is committed to education and advocacy through film/television. • 138% increase in television coverage on climate change • 1000+ Environmental Media Association seals and counting Game Design with an environmental focus allows players to understand environmental degradation or issues and helps players to feel empowered to take action • 10% reduction in carbon footprint commitment by Space Ape Game and creation of a 'green team' • 100s of climate-themed games have been released over the past few years

Building and Construction Trades

This sector provides a foundation in the Building and Construction Trades industry for secondary students in California. Students engage in an instructional program that integrates academic and technical preparation and focuses on career awareness, career exploration, and skill preparation in the Building and Construction Trades industry. The sector encompasses four career pathways: Cabinetry, Millwork, and Woodworking; Engineering and Heavy Construction; Mechanical Systems Installation and Repair; and Residential and Commercial Construction. These pathways emphasize processes, systems, and the way in which structures are built. The knowledge and skills are acquired in a

sequential, standards-based pathway program that integrates hands-on, project-based, and work-based instruction. Standards included in the Building and Construction Trades sector are designed to prepare students for technical training, postsecondary education, and entry to a career.

Green Job Examples in this Sector	Sustainable Carpenter, Green Construction Laborer, Construction Manager, Energy Efficient Builder, Green Interior Designer, Green Roofing, Insulator, Natural Home Builder, Plumber Water Conservation, Pollution Control, Sustainable Home Design, Weatherization, Urban planner See: https://www.careeronestop.org/GreenCareers/ExploreGreenCareers/green-construction.aspx
Relevant Concepts and Statistics for Sustainability	Green Building is design, construction, and operation that reduces or eliminates negative environmental impacts, and can create positive impacts on our climate and natural environment. - Green construction The green construction workforce is estimated at 7.2 million workers in 2008-and is growing considerably. 40-48% of all non-residential construction in the U.S. is classified as “green” From 2011-2014, national green construction generated \$167.4 billion in GDP - LEED certification and energy statistics 19% increase in construction of LEED-certified residential homes since 2017. In 2014, LEED-related employment directly contributed \$1.09 billion of individual income tax to states. In a study of 7,100 certified construction projects, more than 90 percent were improving energy performance by at least 10 percent. Policies, Codes, and Certifications address the cross-cutting categories of site selection, water conservation, energy efficiency, renewables, indoor environmental quality, and resource conservation through enforceable standards. Sustainable design has been growing since 1990 - CA Building code is now bronze leed It is estimated that there are nearly 600 green product certifications in the world with nearly 100 in use in the U.S. 28.3% of buildings in Atlanta have Energy Star Certification The number of LEED-certified projects in the United States rose from 296 certifications in 2006 up to over 67,200 in 2018.

Business and Finance

People trained in fields such as business management, international trade, and various financial services specialties (e.g., accounting, banking, and investing) will find that their skills are highly marketable. Students master basic business principles and procedures before proceeding to the career path specializations. The specializations emphasize concepts of accounting and finance, including computer applications, taxes, investments, and asset management as well as pathways in international business and business management. Because almost every business and organization has a financial

and management component, students will find that opportunities exist in many career paths in addition to those in business and finance.

Green Job Examples in this Sector	Energy Broker, Energy Trader, Securities and Commodities Trader, Green marketer, Accountant, Auditor, Compliance officer, Environmental Professional, Financial Analyst, Finance Manager, Green Consultant, Logistics Analyst, Retail Buyer, Supply Chain Manager, Wholesale Buyer, Green funding, Chief Sustainability Officer
Relevant Concepts and Statistics for Sustainability	Corporate Commitments to sustainability are actionable goals that companies are committing to that have positive impacts on the climate. • 23% of companies have made a public commitment that by 2030 they will be carbon neutral • 77% of consumers say they would be more willing to purchase a company's products or services if the company demonstrates a commitment to addressing social, economic and environmental issues: ◦ 73% of investors agreed. • 30% of Fortune 500's are Involved in Climate-based Initiatives Finance Investments are corporations, businesses, or individuals investing their money in sustainable businesses and initiatives • \$51 billion in new sustainable investments in 2020 • 479 green bonds issued worldwide in 2019, up by a quarter compared to the previous year.

Education, Child Development, and Family Services

The Education, Child Development, and Family Services sector provides students with the academic and technical preparation to pursue high-skill, high-demand careers in these related and growing industries. The sector encompasses four distinct, yet interrelated, career pathways: Child Development, Consumer Services, Education, and Family and Human Services. The Child Development pathway provides students with the skills and knowledge they need to pursue careers in childcare and related fields, and the Education pathway emphasizes the preparation of students to become teachers. The Consumer Services pathway gives students the employment and management skills needed in careers that involve helping consumers. The Family and Human Services pathway provides students with skills needed for careers related to family and social services. The standards are designed to integrate academic and career technical concepts. The anchor standards include Consumer and Family Studies comprehensive technical knowledge and skills that prepare students for learning in the pathways. The knowledge and skills are acquired within a sequential, standards-based pathway program that integrates hands-on projects, work-based instruction, and leadership development—for example, through Family, Career and Community Leaders of America (FCCLA). Standards in the Education, Child Development, and Family Services sector are designed to prepare students for technical training, postsecondary education, and entry to a career.

Green Job Examples in this Sector	Director of Sustainability, STEM teacher, Carbon Consultant, Environmental Consultants, Organic Research and Development, Professor
Relevant Concepts and Statistics for Sustainability	Green Education in K-12 Schools is the movement in the public education system to integrate environmental literacy into the campus, curriculum, and culture. • More than 40 California districts and county offices of education have adopted climate change resolutions since 2017

	Green Education in Higher Education is the movement in the higher education system to integrate environmental literacy into the campus, curriculum, and culture. • More than 90 colleges across the country have an environmental department • 66% of prospective families say a commitment to the environment by a college will affect their decision to apply
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Energy, Environment, and Utilities

This sector is designed to provide a foundation of knowledge and skills in careers related to energy, environment, and utilities. The pathways emphasize real-world, occupationally relevant knowledge, skills, and experiences of significant scope and depth in Environmental Resources, Energy and Power Technology, and Telecommunications. The standards integrate academic and technical preparation and focus on career awareness, career exploration, preparation for entry to technical-level employment, and alignment with postsecondary programs focused on energy, utilities, and related fields.

Green Job Examples in this Sector	Landscape designer, Solar Energy Systems Engineer, Solar panel technician, Wind energy engineer, Mechanical engineer, Refuse materials collector, Recycling coordinator, Hazardous materials worker, Energy Auditor, Energy Trader, Environmental health and safety director, Wind turbine technician See: https://www.careeronestop.org/GreenCareers/ExploreGreenCareers/energy-efficiency.aspx; https://www.careeronestop.org/GreenCareers/ExploreGreenCareers/environmental-protection.aspx
Relevant Concepts and Statistics for Sustainability	Renewable Energy is a form of energy sourced from natural processes that may be replenished at an equal or quicker rate than it is being consumed. The adoption of renewable energy began in industrial applications to improve efficiency and lower the cost of energy production but has recently seen an exponential rate of acceptance within common households. Renewable energies include solar/photovoltaic, wind, biomass, geothermal, tidal and wave, hydropower, etc. • Solar/photovoltaic energy sees highest average Year-Over-Year annual growth (23.67% 3-year average, 2018-2020) • An estimated 36% of California's electricity came from renewable energy sources in 2019, with Solar leading all other sources • More than 50% of household energy use is related to heating & air-conditioning • The development of renewable energy grids on public land contributed over \$660 million to federal, state, local governments since 1982. Clean Energy Grids are decentralized, smart systems operating on renewable energy enabling more efficient energy/power transfer. • U.S. Smart grids installations will cost less than \$476 billion over the next 20 years but will provide approximately \$2 trillion in customer benefits over that time. • Investments in smart grid infrastructure and smart meters totaled \$39 billion in 2019. Sustainable Wireless Internet refers to equitable access to public information on the world-wide-web. Sustainability in this context implies a systems-thinking approach to allow reputable and free exchanges of information. Global accessibility to information across

	different geographic regions (i.e., developing vs. first world nations) should also be considered. • 2 million websites that save 20KB in online data transfer storage may reduce world CO2 emissions by 59 tonnes (equivalent to flying from NY to Amsterdam and back 25 times) • Internet access increased by eightfold between 2000 and 2016 from 413 million to over 3.4 billion users worldwide. Hazardous Waste & E-Waste Safe Disposal refers to the removal of electronic products deemed unusable in a manner that does not harm the environment. These items usually contain toxic compounds (i.e., mercury, cadmium, lead, etc.), hence the term 'hazardous'. • "Recycling one million laptops saves the energy equivalent to the electricity used by more than 3,500 US homes in a year." • The yearly accumulation of e-waste has grown 115% between 2016 and 2021 from 49.3 million tons to 57 million tons. • "In 2017, over 1.5 million tons of hazardous wastes were managed by recycling." Recycling is the process of converting waste materials into new materials and objects. It usually involves three steps: Collection and processing, manufacturing, purchasing new products made from recycled materials. • California's per resident disposal rate is 6.7 pounds/resident/day (recycling rate of 37%) • "1 tonne of recycled aluminum saves 14,000 kilowatt hours (Kwh) of energy, 40 barrels of oil, 238 million Btu's of energy, and 10 cubic yards of landfill space." • Recycling comprises 13.5% of global treatment and disposal of waste
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Engineering and Architecture

This sector is designed to provide a foundation in engineering and architecture sector pathways and occupations for students in California. Students are engaged in an instructional program that integrates academic and technical preparation and focuses on career awareness, career exploration, and career preparation in four pathways that emphasize real-world, occupationally relevant experiences of significant scope and depth: Architectural Design; Engineering Technology; Engineering Design; and Environmental Engineering. To prepare students for continued training, advanced educational opportunities, and direct entry to a career, the Engineering and Architecture programs offer the following components: classroom, laboratory, and hands-on contextual learning; project- and work-based instruction; and leadership and interpersonal skills development.

Green Job Examples in this Sector	Urban planner, Fuel Cell Engineer, Environmental engineer, Biofuel engineer, Wind energy engineer, Solar engineer, Water project manager
Relevant Concepts and Statistics for Sustainability	Architecture and Design that focuses on green building is the use of approaches that create buildings and development that are environmentally responsible and resource-efficient throughout a building's life cycle, from site selection to demolition or reuse. • Environmental design workforce ○ 1.88% growth in environmental design workforces ○ 735 environmental design degrees awarded in 2017 alone • Green architecture worldwide ○ 20,000 new homes in New Zealand will be green building certified

	○ 1,000 professionals in Jordan have been through a green building training course ○ 30% growth from 2016 to 2017 in sustainable building certification Engineering and Maintenance is the responsibility to provide technical guidance and the overall planning, design, installation, and maintenance of the environmental engineering phases of conservation activities. ● In 2021 the new administration invested \$2 trillion in clean energy ● Renewable energy grew 12.2% in 2018 ● 3% job growth in environmental engineers from 2019-29
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Fashion and Interior Design

The Fashion and Interior Design sector provides students with the academic and technical preparation necessary to pursue high-skill, high-demand careers in these related and growing industries. The sector encompasses three distinct career pathways: Fashion Design and Merchandising, Interior Design, and Personal Services. The standards are designed to integrate academic and career technical concepts. The anchor standards include Consumer and Family Studies comprehensive technical knowledge and skills that prepare students for learning in the pathways. The knowledge and skills are acquired within a sequential, standards-based pathway program that integrates hands-on projects, work-based instruction, and leadership development such as that offered through Family, Career and Community Leaders of America (FCCLA). Standards in this sector are designed to prepare students for technical training, postsecondary education, and entry to a career.

Green Job Examples in this Sector	Used clothing broker, Fashion Buyer, Sustainability consultant, Fashion Designer, Bioengineers, Textile Chemists, Agricultural Consultants, Supply Chain Managers, Personal Stylists, Authentication Experts, LEED Certified Green Interior Designer, Interior Landscape Designer
Relevant Concepts and Statistics for Sustainability	Used Fashion is clothing that has been used once or more, and is now being reused and repurposed, closing the cycle of production and consumption. ● the U.S. secondhand clothing market is projected to more than triple in value in the next 10 years – from US\$28 billion in 2019 to US\$80 billion in 2029 ● Secondhand clothing expanded 21 times faster than conventional apparel retail did in 2019 ● Secondhand fashion is poised to grow 185% Fashion Design is the design, manufacturing, and distribution of new clothing. Sustainable fashion works to green all aspects of this process. ● The global ethical fashion market size reached a value of nearly \$6.35 billion in 2019 ● 2015. The market is expected to grow from \$6.35 billion in 2019 to \$8.25 billion ● The growth is mainly due to the growing awareness about using ethical fashion for sustainability Green Interior Design is built of three fundamental principles to “green” interior design: energy efficiency, resource conservation, and health. When designing or remodeling an interior, optimizing energy efficiency reduces pollution and saves resources for the entire lifetime of the interior. ● Sustainable interior design has been growing for over 20 years ● More than 131 interior design firms

- [Growth in Demand for Green Homes](#)

Health Science and Medical Technology

The standards in this sector represent the academic and technical skills and knowledge students need to pursue a full range of career opportunities in health science and medical technology, from entry-level to management as well as technical and professional career specialties. The standards describe what workers need to know and be able to do to contribute to the delivery of safe and effective health care. The six career pathways are grouped into functions that have a common purpose and require similar attributes. The pathways are Biotechnology, Patient Care, Health Care Administrative Services, Health Care Operational Support Services, Public and Community Health, and Mental and Behavioral Health. Standards for each career path build on and continue the anchor standards with more complexity, rigor, and career specificity.

Green Job Examples in this Sector	Public health engineer, Air pollution analyst, Epidemiologist, Disaster management specialist, Environmental Toxicologist, Environmental inspector, Environmental sanitation engineer, Groundwater protection specialist
Relevant Concepts and Statistics for Sustainability	Public Health promotes and protects the health of people and the communities where they live, learn, work and play. • The global HVAC systems market size was valued at USD 130.5 billion in 2019 and is projected to rise by 6.1% from 2020 to 2027. • 4% growth in Health and Safety Engineers 2019-29 Environmental Hazards are generally measured as exposure to pollution such as the amount of dust or sulfur dioxide in the air or the presence/amount of soil or groundwater contamination on the property. • EPA vows to speed cleanup of toxic superfund sites • 8% growth in Environmental Specialists. much faster than average

Hospitality, Tourism, and Recreation

The Hospitality, Tourism, and Recreation sector provides students with the academic and technical preparation necessary to pursue high-skill, high-demand careers in these related and growing industries. The sector encompasses three distinct, yet interrelated, career pathways: Food Science, Dietetics, and Nutrition; Food Service and Hospitality; and Hospitality, Tourism, and Recreation. The standards are designed to integrate academic and career technical concepts. The anchor standards include Consumer and Family Studies comprehensive technical knowledge and skills that prepare students for learning in the pathways. The knowledge and skills are acquired within a sequential, standards-based pathway program that integrates hands-on projects, work-based instruction, and leadership development such as that offered through Family, Career and Community Leaders of America (FCCLA). Standards in this sector are designed to prepare students for technical training, postsecondary education, and entry to a career.

Green Job Examples in this Sector	Eco-tourist guide, Environmental resource manager, Environmental consultant, Energy conservation consultant, Chef, Vintner, Director of Housekeeping, Sustainability manager
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Relevant Concepts and Statistics for Sustainability	Tourism is a collection of activities, services, and industries that delivers a travel experience, including transportation, accommodations, eating and drinking establishments, retail shops, entertainment businesses, activity facilities, and other hospitality services provided for individuals or groups traveling away from home. - Local tourism often relies on a region's natural beauty, and restoring the local vegetation and wildlife in certain areas can lead to increased tourism. Eco-tourism is responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education 68% of travelers intended to stay in an eco-accommodation in 2018 alone 87% of tourists say that they want to travel sustainably 67% of travelers would be willing to spend at least 5 percent more on their travel to ensure it was as low impact on the environment as possible Hospitality and Accommodations is the business of providing a place for tourists to stay, such as hotels, vacation rentals, and hostels. Hilton will cut its environmental footprint in half and double its social impact investment by 2030 According to a survey of 72,000 Hilton guests, social, environmental and ethical considerations are central to their buying preferences, especially those younger than 25 years old.
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Information and Communication Technologies

Information and Communication Technologies (ICT) have expanded the need for employees who can understand, manage, and support all rapidly emerging, evolving, and converging computer, software, networking, telecommunications, Internet, programming, and information systems. Essential skills for careers in the ICT sector include understanding systems that support the management and flow of data, the ability to work well and communicate clearly with people, and the ability to manage projects efficiently. The ICT sector meets national criteria for high demand, high wages, and high skills and provides students with excellent opportunities for interesting work and good pay. More than 70 percent of jobs in this sector will require a bachelor's degree or higher by 2018.

Green Job Examples in this Sector	Green data analyst, Environmental Software engineer, Environmental Sustainability IT
Relevant Concepts and Statistics for Sustainability	Green Technology is a type of technology that is considered environmentally friendly based on its production process or its supply chain. Apple, Dell, Amazon, Google, and other large tech companies have made pledges in the last year to reduce their carbon footprint and improve other sustainability initiatives. Green Tech Festival is a place to bring together all who want to make progression green technology. Information Technology and Communications is the application of technology to solve business or organizational problems on a broad scale. There is demand for Green IT Efficient power supplies and power management can reduce in-use desktop power consumption by 10-30%

- [New technologies can reduce power consumption in data centers by 50-80%](#)

Manufacturing and Product Development

The Manufacturing and Product Development sector provides a foundation for secondary students in California in manufacturing processes and systems, including graphic design production, machine tooling and forming, welding and materials joining, and product innovation and design. Students engage in an instructional program that integrates academic and technical preparation and focuses on career awareness, career exploration, and skill preparation in four pathways. The pathways emphasize real-world, occupationally relevant experiences of significant scope and depth in manufacturing. The knowledge and skills are acquired within a sequential, standards-based pathway program that integrates hands-on, project-based, and work-based instruction. Standards in this sector are designed to prepare students for entry to a career, post-secondary education, or advanced technical training.

Green Job Examples in this Sector	Sustainable Product Designer, EcoGreen Packaging Designer, Chemist, Electric vehicle engineer See: https://www.careeronestop.org/GreenCareers/ExploreGreenCareers/manufacturing.aspx
Relevant Concepts and Statistics for Sustainability	Cradle to Cradle Design and the Circular Economy: The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. Product Design/Development is when companies commit to developing products that have a positive impact on the environment through materials, manufacturing, etc. ● 66% of respondents said they would be willing to pay more for products coming from companies that have demonstrated a commitment to making a positive environmental impact. ● 75% of Millennials are willing to pay extra for eco-friendly products. ● Product materials growth in renewable/reusable Product Manufacturing is the process of making a product and the materials and process that goes into creating it ● The EPA has an E3: Economy - Energy - Environment program that helps business adapt to an eco-friendly future ○ There are 948 E3 facilities across the U.S. Participants have... ■ Reduced more than 182 pounds of air emission ■ Reduced over 2.2 million pounds of hazardous waste ■ Created 1,515 jobs in sustainable manufacturing

Marketing Sales and Service

The Marketing, Sales, and Services sector is designed to align career-path course work with current and projected employment opportunities. There is a basic business foundation in this sector: marketing and innovation are two major competitive issues for business today. Marketing includes the processes and techniques of identifying, promoting, and transferring products or services to consumers and is a function of almost every business. It exists within an environment of rapidly changing technology, interdependent nations and economies, and increasing demands for ethical and social responsibility.

The three pathways in this sector (Entrepreneurship/Self-Employment, Marketing, and Professional Sales) emphasize training to meet the growing need for marketing professionals with skills in communication, small business, self-employment, advertising, marketing strategies, product and service management, and promotion and selling concepts. These pathways provide a firm foundation for advanced education, entry to a career, and success in the global marketplace. All industry sectors include entrepreneurship and marketing. Therefore, students in the Marketing, Sales, and Services sector have a variety of career options.

Green Job Examples in this Sector	Green product marketer Green product manager Electric Vehicle Salesperson
Relevant Concepts and Statistics for Sustainability	Green Marketing in terms of environmentalism is linking the buyer and sellers needs of sustainability and products and sparking interest on both sides, hopefully leading to sales • 72% of respondents were actively buying more environmentally friendly products than they did just five years ago • products marketed with environmental claims each year in the US grew from around 100 in 2004 to more than 1,500 in 2009. • Nearly 70% of consumers in the U.S. and Canada think it is important that a brand is sustainable or eco-friendly Sales is the actual act of selling products and goods to the buyer • Electric vehicle sales expected to grow 50% in 2021 • 50% of CPG growth from 2013 to 2018 came from sustainability-marketed products • Sales of sustainable products have risen nearly 20% since 2014

Public Services

A public service is one that is provided by the government to its citizens, either directly or through the financing of another entity to provide that service. Careers in public service are unique because they center on challenging issues that define the public agenda and involve the provision of vital services to the public—from local to international levels. Public service professions offer many career opportunities, including the following career pathways: Public Safety, Emergency Response, and Legal Practices. Students engage in an instructional program that integrates academic and technical preparation and focuses on career awareness, career exploration, skill preparation in the industry, and preparation for postsecondary education and training. Knowledge and skills are learned and applied within a sequential, standards-based pathway program that integrates classroom, laboratory, and project- and work-based instruction. Standards in this sector are designed to prepare students for technical training, postsecondary education, and entry-level employment.

Green Job Examples in this Sector	Environmental lawyer, Compliance manager, Financial analyst, Policy analyst, Policy advocate, Political Activist See: https://www.careeronestop.org/GreenCareers/ExploreGreenCareers/government-al-regulatory-administration.aspx
Relevant Concepts and Statistics for Sustainability	Environmental Law is the collection of laws, regulations, agreements, and common law that governs how humans interact with their environment. • 630+ active legal proceedings at EarthJustice alone • Approximately 50,100 environmental lawyer jobs will be added by 2028.

	• 83K jobs across the Midwest supported by the electric car economy through NRDC's legal work Environmental Activism refers to the coming together of various groups of individuals and organizations that work in collaboration in social, scientific, political, and conservational fields with the main purpose of addressing environmental and social concerns. • 6 million people joined the latest climate protests • 64% of adults say protecting the environment should be a top priority for the president and Congress Government Action is the governing bodies of cities, states, and countries taking action to fight climate change and environmental issues that affect its people • 63% majority of Americans say stricter environmental regulations are worth the cost. • More than 9,000 cities around the world have agreed to share, implement, and monitor their climate action plans • Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis
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Transportation

This sector is designed to provide a foundation in transportation services for all industrial technology education students in California. There are eight focus areas that fall under the Transportation sector, each with different career opportunities. The focus areas are On-Road; Off-Road; Stationary; Rail; Water/Sea; Air; Space; and Small Engines and Specialty Equipment. The pathways in the Transportation sector emphasize real-world, occupationally relevant experiences of significant scope and depth in three areas: Operations, Structural Repair and Refinishing, and Systems Diagnostics, Service, and Repair. The standards are designed to integrate academic and technical preparation and focus on career awareness, career exploration, and skill preparation in the three pathways. Integral components include classroom, laboratory, and hands-on contextual learning; project- and work-based instruction; and leadership development. The standards in this sector prepare students for continued training, postsecondary education, and entry to a career.

Green Job Examples in this Sector	Mechanical engineer, Transportation manager, Truck driver, Green Vehicle Technician, Green Vehicle Engineer, Fuel Cell Technician, Fuel Cell Engineer, Logistics and Operations, Bicycle Repair, Electric Transport (bicycles, scooters, etc.) Engineer See: https://www.careeronestop.org/GreenCareers/ExploreGreenCareers/transportation.aspx
Relevant Concepts and Statistics for Sustainability	Carbon neutral transportation seeks to achieve net-zero greenhouse gas emissions by releasing and offsetting equal amounts of carbon dioxide. Greenhouse gas emissions from transportation make up 28% of total US emissions and more than 50 percent of California's greenhouse gas emissions. California governor Newsome passed an executive order on September 23, 2020, that by 2035, all new passenger vehicles sold in California will be zero-emission. • Electric vehicle sales in the US increased 80% from 2017 to 2018

	• EVs will make up 10% of global passenger vehicle sales by 2025, 28% in 2030, and 58% in 2040 • The alternative fuel vehicle market was valued at \$255.01 Billion in 2016 and is projected to be worth \$592.30 Billion by 2022 Sustainable Infrastructure enables other sustainable development, such as an increase in electric cars. • The country's EV power load rose 4.68 TWh in 2020, a 21.3% increase from 2019 • 75,000 public charging stations in 2019 and to an estimated 90,000 in 2020 Walking and rolling minimize the carbon footprint of using personal vehicles to commute short distances. In addition, there is a growing market for micro-mobility which provides more opportunities for city dwellers to travel short distances through a network of shared electronic bikes, scooters, cars, or mopeds located at a central location or free-floating. • Biking instead of driving short distances reduces your emissions by 75% • Since 2005, Safe Routes to Schools has partnered with 14,000 schools across all 50 states • In 2019, people took 136 million trips on shared bikes/scooters, a 60% increase from the previous year • US micro-mobility market could potentially to be worth between \$200B – \$300B by 2030 Green public transportation seeks to electrify and improve public transportation options in order to decrease car travel. In recent years there has also been an increase in the car-sharing or ride-hailing market which provides short car trips as a paid service. • The global car-sharing market was worth \$2.5 billion in 2019 and is expected to be worth \$9 billion by 2026 • The ride-hailing services market will grow by \$47.03 billion between 2020 and 2024 • The global electric bus market is projected to reach 256,000 units by 2027
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Resources and Citations

- U.S. Department of Labor: [Green Jobs Definition and Data](#), and [Projected Growth in Jobs](#) (April 2022)
- Career One Stop: [What Are Green Careers?](#)
- U.S. News Money: [Highest Paying Jobs Without a Degree](#) (some are green economy jobs)
- A Guide to Green Careers: <https://www.learnhowtobecome.org/career-resource-center/green-careers/>
- Green Jobs Definition: https://www.bls.gov/green/green_definition.pdf
- UN SDGs: [The Green Economy could Create 24 million jobs](#)
- Green Job Growth: [50% since 2019 \(2022\)](#) and [average growth rate of at least 8.6% across all green jobs during the next decade](#) with some set to grow over 68% (2023)
- [8 out of 10 top-paying green jobs offer salaries of \\$100,000 or more per year](#) (2023)
- World Employment and Social Outlook (2018): [Green Jobs](#)
- January 2023: [Green jobs are booming but employees not skilled enough to take them](#)