



Redefining Green Jobs for a Sustainable Economy

DECEMBER 2, 2019 – AMANDA NOVELLO AND GREG CARLOCK

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The movement toward a Green New Deal policy platform¹ has become the predominant idea for addressing climate change. It would involve a massive government investment in equitable decarbonization, which would create millions of “green jobs.” The impact would be this large not only because greening the economy will be labor intensive across all sectors, but also because a green jobs guarantee would be required in order to ensure that all workers would be supported throughout this green transition.

This movement for addressing the climate crisis presents a unique opportunity to define the type of economy that works for everyone—not just one that moves away from extractive activities and toward regenerative ones, but also one that is also centered on racial, economic, environmental, and intergenerational justice. What the movement calls for is a sustainable economy—one that, in short, meets the needs of people now, and in the future. It should sustain the natural environment, while ensuring equitable access to environmental goods such as clean air and water; it should also support the people who rely on those goods, by promoting family-sustaining jobs. It should provide and encourage work that contributes to meeting these goals, and discourage work that doesn’t. As such, Green New Deal policies that would help achieve a sustainable economy

should be guided by these principles, including but not limited to a green jobs guarantee.

One challenge faced by the movement toward a greener economy is that, if you ask anyone what the green economy is—who currently works in it, what they do, and what the green economy of the future should look like—you can get widely different answers, even from people inside the movement itself. That is because discussions of the past, present, and future of the green economy have not been supported by a unified definition and common understanding of what constitutes a green job.

This report seeks to provide a framework for understanding what a truly sustainable economy would look like in terms of employment. It begins by exploring standard definitions of green jobs, including their historical context, to give an idea of what most people think of when talking about the size of the green economy. It then proposes an expanded definition and framework of green jobs to encompass the principles of equity and sustainability deemed critically important by today’s movement. Finally, it recommends ways in which this expanded definition of green jobs can be integrated into policy, particularly the Green New Deal.

This report can be found online at: <https://tcf.org/content/report/redefining-green-jobs-sustainable-economy/>

What Are Green Jobs?

The idea of what activities are considered green has changed over time, as has the understanding of humans' relationship with nature. From the land conservation policies of President Teddy Roosevelt and the land restoration efforts of President Franklin Roosevelt, to the regulation of air pollution under President Eisenhower and water pollution under President Nixon, Americans have increasingly demanded of their government to conserve, protect, and restore the lands, waters, and resources that constitute the nation and support life. The push for environmental sustainability—not only the preservation but also the efficient use and fair distribution of the Earth's finite resources—is much younger.

Throughout this history, the notion of what we now refer to as green jobs—work related to sustaining a healthy environment—has expanded to cover a larger and larger portion of the economy. To understand this expansion, this report looks at three waves of environmentalism²—conservation, regulation, and equity and investment—to uncover the prevailing ideas about green jobs during those times, and in addition, reviews how green employment is measured.

The First Wave: Conservation

The first wave of environmentalism focused on the conservation of nature. When the conservation movement began in the United States, it was not a new idea: indigenous people had been living off the land using sustainable and regenerative practices for centuries.³ But with westward expansion by European settlers and the onset of the industrial revolution, a largely communitarian native society was overtaken by a private ownership society, and sustainable practices largely gave way to extractive ones. And unlike native conservation, which was grounded in an understanding of the balance between current and future consumption—and for many, the inherent value of all living things in and of themselves—the early U.S. conservation movement was driven by demand for leisure activities, such as camping.⁴

The movement to preserve what was naturally grand and beautiful was sparked by romantic images from explorers and naturalists such as John Muir, but there was also support for conservation efforts even from wealthy businessmen, whose travel experiences taught them that nature provides not only individual benefits, but also economic benefits as well.⁵ This broad support and activism eventually translated to government action. In the late 1800s, the land around the natural attractions of Yosemite and Yellowstone were set aside by the federal government and declared public parks, and in 1916, President Woodrow Wilson signed a bill creating the National Park Service as an official agency under the Department of the Interior. This “Organic Act” set out to “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations”—one of the earliest recorded recognitions of intergenerational justice in the U.S. environmental context.⁶

While the original enactment of the National Park Service had inherent economic benefits—increasing the well-being and value of leisure time for current and future generations—the economic benefits of conservation were further institutionalized by the New Deal. One month after taking office, President Franklin Delano Roosevelt (FDR) took a step to mitigate the Great Depression by expanding, preserving, and making more accessible the nation's national parks and monuments. Through executive order, FDR created the Civilian Conservation Corps (CCC) to address both high unemployment and environmental concerns by employing millions of workers (albeit mostly white men). The impact was far from trivial: beyond providing stable work to the benefit of some three million men and their families, the workforce—once dubbed the “tree army”—was responsible for planting billions of trees, managing forests to stave off pests and fires, establishing hiking trails and camping grounds across millions of acres, and paving roads and building other infrastructure that provide us access to these sites still today.⁷

TABLE 1

Current Green Jobs in Conservation	
	<i>Employment</i>
Conservation Technicians	30,570
Conservation Scientists	22,200
National Park Service	20,000
Zoologists and Wildlife Biologists	19,300
Fish and Wildlife Service	8,792
Foresters	8,300
Fish and Game Wardens	6,040
Source: BLS 2018, FederalPay.org 2017, and National Park Service 2017 data	

Conservation Jobs Today

While they didn't use the term green jobs at the time, a green job during the conservation era was any job related to the sustainment of related activities. Today there are 419 geographic areas under the management of the National Park Service⁸ (more than a quarter of which were added during the CCC era). The green jobs involved in protecting and maintaining this land comprise a sizeable sector of the economy: the National Park Service alone employs 20,000 paid workers; if its 315,000 annual volunteers were also paid green jobs, it would employ as many green workers as there are teachers and instructors nationwide.⁹ Other conservation jobs, according to the Bureau of Labor Statistics, include conservation scientists and foresters; zoologists and wildlife biologists; conservation technicians that map, patrol, and monitor land; and government workers in federal agencies, such as the Fish and Wildlife Service and similar state agencies—which, all together, represent over 100,000 workers.

Conservation also fuels other economic activity: a 2018 study found that the \$20.2 billion spent by park visitors annually generated more than 329,000 jobs in the areas around the parks.¹⁰ So while those additional jobs might not be considered green jobs, it's clear that the products of conservation-oriented labor provide benefits beyond its direct impacts.

The Second Wave: Regulation

Environmentalists in the second wave—regulation—realized that sustainability ought to be defined as much by what happens outside of conserved lands as by what happens on them. Indeed, humans need environmental goods—water, air, soil—for survival, and so environmentalists soon recognized that conserving and protecting some plots of land while neglecting the rest was a poor strategy.

Rachel Carson, the author of *Silent Spring*—one of the most important works of environmental literature in history—became increasingly aware of how industrialized food systems harmed ecosystems and human health while she

TABLE 2

Current Green Jobs in Regulation	
	<i>Employment</i>
Remediation and Related Waste Management Services	149,980
Environmental Scientists and Specialists	85,000
Other Earth Sciences (Including Geoscientists, Microbiologists, Hydrologists)	59,400
Environmental Engineers	55,400
Environmental Protection Agency Staff	14,172
Sources: BLS 2018 data and EPA.gov 2019 data	

was an employee at the federal Fish and Wildlife Service, a conservation-era agency. Carson’s book was fundamental to the second wave of environmentalism, emphasizing the need for government to regulate industries and other activities that were contributing to environmental destruction.¹¹ Absent government intervention, oil spills, river fires,¹² and other disasters were becoming commonplace in a system that not only allowed environmental destruction, but incentivized it. Without laws and punishments against dumping toxic waste into public waterways, for example, the practice was the cheaper option when weighed against proper disposal, or the elimination of it entirely through the development of new industrial processes.

Thus, this recognition of the need for national environmental policy—supported by a historic 20 million Americans protesting for action¹³—led to the creation of the Environmental Protection Agency (EPA) in 1970. In its first twenty years, the EPA implemented the Clean Water Act to establish basic standards for pollutants in fresh and waste water, and updated the Clean Air Act to achieve major emission reductions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x), the primary precursors of acid rain, from the power sector. Importantly, the EPA has been responsible for tracking and regulating new potential environmental harms,

building data for public use and local monitoring, and setting and enforcing environmental standards for all industries.

Regulation Jobs Today

The regulatory era of environmentalism added the notions of remediation and restoration under the umbrella of green, environmental work. In particular, some of the following roles could now be considered green: those whose job it is to understand current and potential environmental harm (environmental, chemical, and biological researchers); those who craft rules and regulations or enforce compliance (government workers and lawyers); those who implement regulatory rules in practice (permit specialists, engineers, and other technical specialists, such as geologists, marine biologists); and those who, in response to regulation, are employed to design, manufacture, and build more sustainable practices (manufacturing workers, designers, construction workers, waste managers). Many regulation jobs are created through the process of compliance with federal regulations and innovating to improve standards—a process that the federal Office of Budget Management estimated provides a net annual economic benefit to the nation of between \$103 billion and \$393 billion in the years between 2009 and 2015.¹⁴ (See Table 2.)

The Third Wave: Equity and Investment

The third and current wave of environmentalism was inspired by the recognition that the first two waves suffered from serious shortcomings. One shortcoming was a lack of consideration for issues of equity, such as the disparate impact that environmentalism has by race and class. Regulation doesn't do away with pollution entirely, for example, and so, due to a mix of causes such as wealth and income inequality, historical redlining, and other institutionalized discriminatory policies and norms, predominantly black and brown communities have had to live closer to hazardous waste and pollution sites than their white counterparts. Another major shortcoming was the lack of investment of public resources in realizing an equitable and sustainable economy. Limiting pollution and environmental destruction through regulation is crucial to maintaining a livable environment, but so too is public investment in the industries, jobs, processes, technologies, social and educational structures, and other institutions that comprise a sustainable economy. For the reasons above, the third wave of environmentalism that emerged in the 1980s can be characterized by its focus on environmental equity and investment.

The concept of environmental equity—that everyone should have the right to a healthy environment, despite their race, class, or other social status—did not begin in the 1980s, but the idea grew more popular out of a greater awareness of the existing environmental inequity. A 1983 report by the U.S. General Accounting Office (GAO), “Siting of Hazardous Waste Landfills and their Correlation with Racial and Economic Status of Surrounding Communities,”¹⁵ found that blacks made up the majority of the population in most communities where offsite hazardous waste landfills were located. The impact of this report fostered a flurry of research on the correlation between race, class, and access to basic environmental goods such as clean air and water, and the structural and institutional roots of environmental injustice. Today's movement recognizes that, nationwide, race is the primary indicator of how likely someone is to live in proximity to toxic pollution, and that this correlation has serious consequences on health outcomes: black Americans are nearly 20 percent more likely to have asthma than whites,¹⁶

and nearly half of Latinos live in counties where air quality does not meet EPA clean air standards.¹⁷ And in fact, these correlations have grown stronger over the years: people of color were more concentrated around hazardous waste facilities in 2007 than they were twenty years prior.¹⁸ Van Jones, former Obama adviser and founder of environmental justice organization Green for All, calls the divide between ecological haves and have-nots—the difference between having clean air and water, and toxic air and water—“eco-apartheid.” He has called instead for “eco-equity,” or a “green economy that is strong enough to lift people out of poverty, and give everybody a stake in the clean and green future.”¹⁹

One key factor in bridging the divides of eco-apartheid and achieving an equitable economy focused on human and environmental well-being is investment. In particular, existing investment—according to third wave environmentalism—should flow away from extractive practices and toward sustainable and healing ones. This investment could take the form of top-down public financial assistance, or the creation of community-based financial institutions to jumpstart sustainable economic development projects. The transition envisioned by the federal-level Green New Deal, for example, aims to mobilize federal resources to decarbonize all sectors of the economy and transition it off of fossil fuels in a way that creates jobs and brings along all communities—capturing the essence of both environmental equity and investment that characterizes third-wave environmentalism.

How Are Green Jobs Currently Defined, and How Many Are There?

Green jobs have only been a subject of economic research for the past fifteen years. Notable reports began appearing in peer reviewed journals since roughly 2004, when economist Mathew Forstater proposed a green public service employment program.²⁰ In 2008, the Political Economy Research Institute published a report proposing a two-year, \$100 billion recovery program to create 2 million energy efficiency jobs.²¹ But until the Bureau of Labor Statistics (BLS) launched its green jobs study in 2010, there was no comprehensive, unified way to track green jobs in the economy. Since then, the definition of green jobs most

frequently used in reports studying the green economy comes from the BLS (which, from here on, this report will refer to as the standard definition).²²

The BLS project was conceived during the implementation of the 2009 American Recovery and Reinvestment Act (ARRA), which, under Van Jones' advisorship, included policies to boost renewable energy production. To fund the project, the 2010 Consolidated Appropriations Act—which made appropriations for the Departments of Transportation, and Housing and Urban Development, and related agencies—included \$8 million for the BLS to measure green jobs in order to “to develop information on (1) the number of and trend over time in green jobs, (2) the industrial, occupational, and geographic distribution of the jobs, and (3) the wages of the workers in these jobs.”²³ The program unfortunately was defunded in 2013, leaving researchers to study the patchwork sector without a consistent source of data.

The standard definition of green jobs used by the BLS in their study captures ideas from all three waves of environmentalism described above, including work in conservation, regulation, and all major sectors targeted for decarbonization. According to the BLS, “Green jobs are either a) Jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources; or b) Jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources.”²⁴ The definition classifies green jobs into three major categories: renewable energy production, energy efficiency, and environmental management.

Renewable energy jobs include all occupations throughout the wind, solar, hydro, biomass, geothermal, and nuclear energy supply chain, including but not limited to those engaged with surveying and mapping, technical consulting, geological services, lawyers, accountants and financial services, electrical, mechanical, and project engineers, construction, marketing, sales, transportation, permitting, installation, quality assurance, and maintenance.

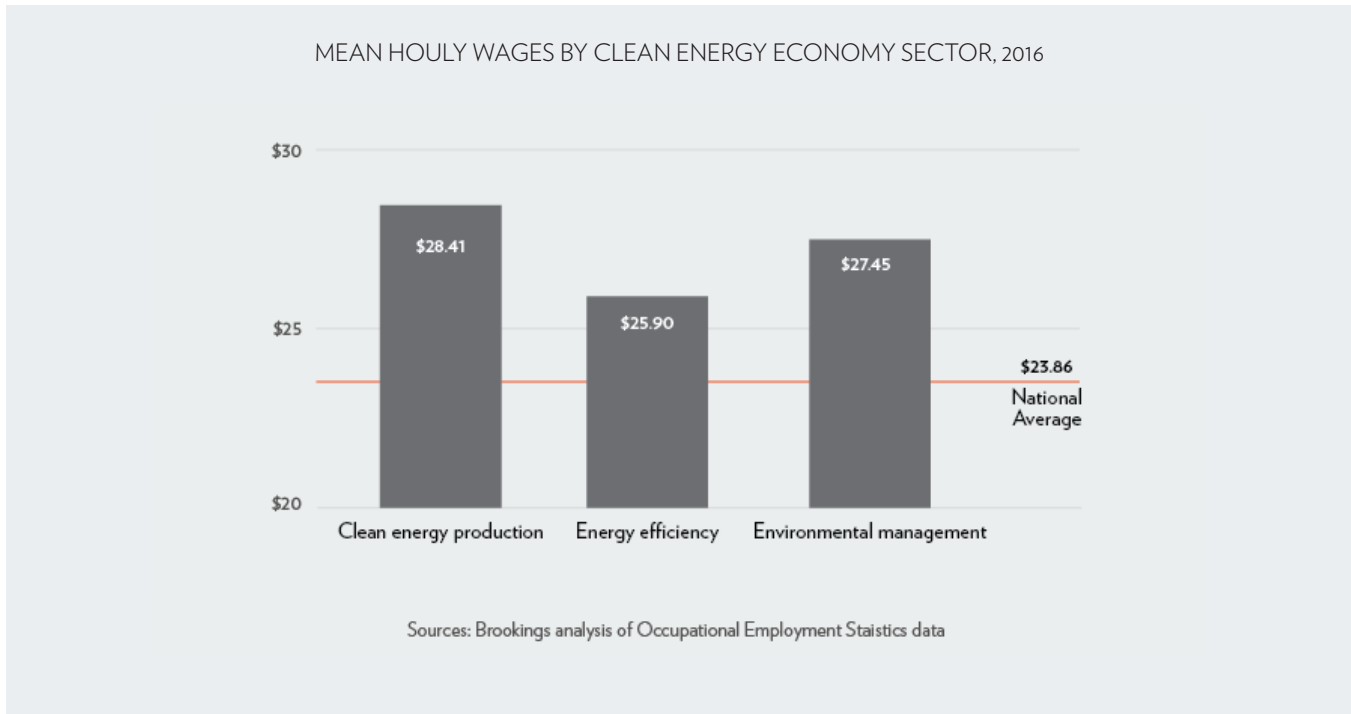
Energy efficiency jobs include jobs related to reducing energy intensity in buildings, appliances, and transportation. Occupations related to energy efficiency include, but are not limited to, heating and air conditioning mechanics and installers, plumbers and pipefitters, roofers, and manufacturers of energy efficient products, including household Energy Star appliances, manufacturers that use recycled products as inputs, public transportation workers, workers making and selling electric and hybrid cars or car parts, and workers building and maintaining a more resilient energy grid.

Environmental management jobs are those that directly relate to the environmental health, including but not limited to recycling material collectors, septic and sewer pipe cleaners and remediation, conservation scientists, environmental engineers, water and wastewater treatment operators, forest management and park workers, environmental educators, regulators, compliance workers, and legislators.

The Green Goods and Services (GGS) survey that the BLS administered in 2010 and 2011 tracked workers in firms engaged in the provisioning of goods and services in these categories. According to the survey, which identified over 300 detailed industries (out of more than 1,000 industries identified in the Census' North American Industry Classification System) involved in the production of green goods and services, sectors with the largest number of green jobs are construction, manufacturing, and professional, scientific, and technical services.²⁵ These job classifications align heavily with the more recent eras of environmental work in sustainability and regulation.

A 2013 report from the GGS 2011 survey estimated that there were 3.4 million workers employed in GGS-related jobs, nearly 160,000 more than the previous year's findings. From 2010 to 2011, the number of green jobs increased or remained constant in all but six states.²⁶ The sectors with the largest share of green employment (the percent of jobs in each sector that is a green job), were construction, agriculture, forestry, fishing, and hunting, as well as management of companies. Most of the workers counted, 2.5 million, were in private industry (representing 2.3 percent

FIGURE 1



of total private industry employment) and nearly 900,000 were in the public sector (representing 4.2 percent of public sector employment).²⁷

A number of reports have come out since 2010, when the Green Goods and Services survey began, taking advantage of some of the research infrastructure the survey provided, and taking advantage of growing interest, from both public and private interests, in the sector. As Brookings put it in the introduction to a 2011 report, “No swath of the economy has been more widely celebrated as a source of economic renewal and potential job creation. . . . The clean economy has remained elusive in part because, in the absence of standard definitions and data, strikingly little is known about its nature, size, and growth at the critical regional level.”²⁸ In that 2011 report, using the BLS definition of green jobs, Brookings determined there were 2.7 million green workers in 2010. But a Brookings report from 2019 came up with dramatically different numbers—1.3 million workers in clean energy production, 4.4 million in energy efficiency, and 877,000 in environmental management—using 2016 data. These dramatically different figures from just six years apart demonstrate how elusive data on the clean economy

is, especially without a long-term standardized process for measuring it.

Other groups have had similar challenges settling on a standard measurement of the green workforce. A national group of professionals and business leaders advocating for environmental policy, E2, reported a figure close to 3.3 million workers in 2018: an increase of 110,000 jobs, or 3.6 percent growth, since their 2017 annual estimate.²⁹ The 2018 U.S. Energy and Employment Report found that in 2016 there were 800,000 workers working in low carbon emission energy generation technology, and 2.35 million more working in some part to design, manufacture, or distribute energy efficient products, which is 133,000 more than the previous year.³⁰ The Environmental Defense Fund reported that, in 2017, the green economy comprised of 4 million to 4.5 million workers, up from 3.4 million in their previous report using 2011 data.³¹ Their findings used data from International Renewable Energy Agency (IRENA), Bureau of Labor Statistics, and Department of Energy, and included energy efficiency and renewable energy, in addition to waste reduction, conservation, and environmental education.

The wide variation in estimates of the size of the green economy point to the limitations of patchwork research on the subject and the need for a government funded initiative to study the sector, or simply to reauthorize and appropriate the BLS to continue where they left off.

Wages and Inclusiveness of Green Jobs

As Americans continue to struggle to find decent pay in a country with the highest share of workers earning low pay than all similarly rich nations,³² some sectors break this trend. Green jobs under the standard definition, for example, are more likely to be middle-class jobs than non-green jobs, and are less likely to be low-paying than non-green jobs (“low-wage” workers in green jobs earn \$5–\$7 more per hour than low-wage workers nationally).³³

Using 2016 data, Brookings found that the mean hourly wages in each major category of green jobs (clean energy production, energy efficiency, and environmental management), were above the national average by at least \$2 per hour (see Figure 1).³⁴ Wages in each category were also at or above \$15 per hour for the lowest decile of earners, at least \$4 per hour above earnings at the low-end for all workers nationally. Out of all occupations nationally, over 30 percent of workers earn under \$15 per hour, whereas that figure is around only 4 percent of green workers. Notably, in effect, there is less income inequality within green jobs than the national average, despite there being lower educational requirements, on average, than jobs nationally.³⁵

The Brookings study also points out that there is room for the sector to grow in terms of racial and gender diversity—only one in five clean energy production and energy efficiency workers are women, and fewer than one in ten are black workers. Some bright spots in terms of inclusiveness include the rising number of women in STEM fields, higher than average black workers in environmental management, in part due to public-sector equal opportunity standards, and higher than average Latino representation in construction work related to clean energy production and energy efficiency.³⁶

Green jobs are also geographically inclusive, as every state and county needs the products and services that green workers provide. The Economic Policy Institute created a measure of “green intensity” of private sector jobs, or the percent of private sector jobs that are green jobs, according to a standard BLS definition.³⁷ Vermont, Pennsylvania, Washington State, and Colorado had the highest green intensity, as of 2010. Arkansas, Idaho, Iowa, Minnesota, and Indiana, were also near the top—demonstrating the wide geographic dispersion of opportunities, for workers in all regions of the country, in the green economy. More recently, Data for Progress has shown that there are more green jobs than brown jobs in all but six states.³⁸

While green occupations such as solar installer and wind turbine technicians are leaders in terms of recent and projected employment growth, it will take some time, organizing, and intentional policy making, to ensure that these standard green jobs are as high-paying as jobs in the extractive economy. For example, the average annual pay for coal mining is above \$86,000, and higher than that for oil and gas extraction, while solar installers and turbine technicians are near \$46,000 and \$57,000, respectively.³⁹

Redefining Green Jobs for a Sustainable Economy

The movement for a Green New Deal, and its embrace by many in the Democratic Party establishment, has underscored the need to transition to a socially and ecologically sustainable economy. And yet, discussions of how this transition will actually take place have been hampered by a standard definition of green jobs that poorly represents the movement’s goals—in particular its goals for social sustainability and equity. Rather than capture only jobs related to energy production, energy efficiency, and resource management, the standard definition of green jobs should be expanded to include a number of sectors that are crucial to a truly sustainable economy.

A green job should refer to any position that is part of the sustainability workforce: a job that contributes to preserving or enhancing the well-being, culture, and governance of

both current and future generations, as well as regenerating the natural resources and ecosystems upon which they rely. And in order for green jobs themselves to be sustainable, they need to be good, living-wage jobs (see Box 1). These green job occupations stand in contrast to work—even decent-paying work—in industries that result in the depletion or degradation of ecological systems and the social, cultural, and political institutions that support them.

Sustainability Criteria for Green Jobs Programs: Identifying Green vs. Brown Jobs

Objective determinations of which careers contribute to the sustainability workforce and which do not require additional evaluation criteria. A proper stakeholder process, including community and labor groups, should be used to establish these criteria, but they should allow for a determination if a job type:

- Supports the pursuit of sustainability, and does not work counter to the goals and principles of sustainability.
- Contributes to efforts to decarbonize the economy by making products, processes, and services more ecologically sustainable and energy efficient, as per the standard definition of green jobs outlined by the BLS.
- Represents decent, family-supporting jobs with fair and equitable wages and benefits, including the right to collectively bargain without retaliation, access to sick and family leave, vacation, full-time hours for those who want them, safe working conditions, health insurance, retirement, and advancement opportunities. (There is much to be learned here from sector-specific legislative proposals, such as the Domestic Workers Bill of Rights, that would lead the way in expanding workers' rights and transforming undervalued jobs into good green jobs.)

- Is inclusive of all workers across locations, genders, races, and ethnicities, and offers special support, training, and recruitment for workers from low-income, minority, under-employed communities, as well as communities most impacted by climate change. This additional support should include full wage replacement, for a predetermined number of years, for workers displaced by the energy transition, in order to bridge any wage gap between wages in extractive and green sector.

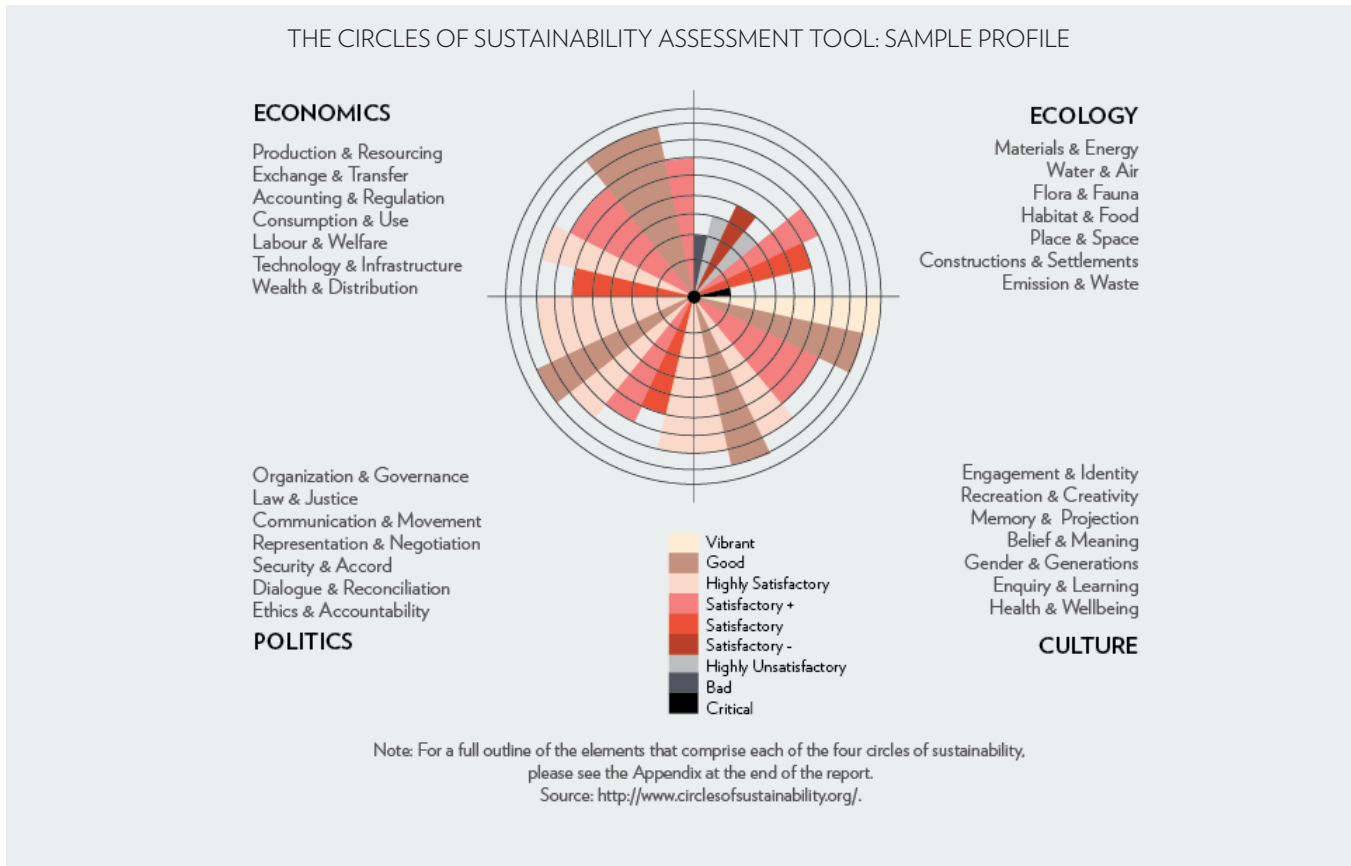
In order to arrive at a definition of green jobs that match the goals of the current movement for long-term sustainability, this section of the report looks first at a holistic model of sustainability, and then assesses what parts of the labor market should be included in the definition of green jobs for a sustainable economy—particularly those related to social well-being, such as the care and education sectors.

What's a Sustainable Economy?

A common way to describe sustainability—sustainability in practice, or sustainable development—is development or resources use that meets the needs and aspirations of the present population without compromising the ability of future generations to meet their own needs.⁴⁰ The term *aspirations* is not typically employed in discussions of sustainability, but it underscores the importance of not merely meeting the requirements of basic survival, but also the capacity to pursue individual and social progress.

In order to assess whether development is sustainable, some practitioners of sustainable development have used a model that acknowledges the multidimensionality of sustainability. The Circles of Sustainability Project, originally hosted by the United Nations Global Compact Cities Programme, for example, performs an assessment of sustainability across four categories, or circles: economics, ecology, politics, and culture (see Figure 2).⁴¹ The environmental movements of the past encompassed some of these elements of sustainability. For example, the movement for conservation focused on ecology and the recreational element of culture, and the regulation era focused on the governance element

FIGURE 2



of politics. What the current movement for equity and investment aims to do is to fill elements of all of the circles—especially technology and infrastructure, materials and energy, and perhaps engagement and identity—in ways that previous waves have not necessarily accounted for. While the Circles of Sustainability framework is designed to assess the comprehensive social and environmental sustainability of a community, it can be instructive to also define the criteria or categories for a workforce that contributes to the overall sustainability of human society.

This multidimensional assessment tool can also be used to examine the extent to which the standard definition of green jobs is suitable for achieving the goals of our current moment in order to identify which elements are not covered by the standard definition, in order to fill the gap.

Two Areas Where the Standard Definition of Green Jobs Requires Expansion

Investing in and valuing the human capacity to care for and educate people is essential for any sustainability agenda. This work is needed for the continuation of humanity, for raising an informed and healthy next generation, and for mitigating the harmful impacts of climate change. However, standard notions of the green economy and green jobs do not take into account for these ideas, and several segments of the sustainability assessment tool, such as gender and generations, wellbeing and health, and enquiry and learning, are missing. Defining green jobs for a sustainable economy therefore will require expansion to better incorporate these elements, particularly by including (1) health care workers and (2) educators, including child care and early education workers, who are crucial for maintaining resources for future generations.

*Health Care Workers Are Green Workers.*⁴² As the United States faces unsustainable trends in the demographics and economics of health care work—in particular, growing demand elder care workers, and low pay causing too few to pursue the work—and as more people face health consequences related to climate change, the health care workforce is pivotal in the transition toward a sustainable economy. Using a sustainability-driven definition of green jobs makes it clear that health care workers are green workers, and that their work is crucial for the long-term well-being of society and the economy, and for intergenerational equity, especially as we face mounting impacts of climate change.

Health care workers that carry out services necessary to the health and resilience of society also work to improve generational well-being—and for a number of reasons, they're also increasingly in demand. For example, as more and more elderly people need care, and as the “grey tsunami” hits, the number of Americans aged 65 and older is projected to double from 2015 to 2060,⁴³ and caregivers will need to respond to that trend. And with decades-long wage stagnation, the impact of the Great Recession on retirement wealth, the near-absence of government-funded pensions, a lack of affordable, comprehensive long-term care insurance, and the rising cost of health care, older Americans will need resource-intensive care. To tend to the number of people that will need care, and the intensiveness of that care, either current care workers will work longer hours, or many more care workers will be needed.

Climate change will put even more pressure on demand for health and care work, and will heighten the intensity of that work. Climate change and environmental degradation translates directly to demand for health workers, and workers across the health care sector are already addressing climate-related changes. According to a COP24 special report, due to global warming, there were 125 million more people made vulnerable to heat waves between 2000 and 2016, and tens of thousands of those cases led to death.⁴⁴ Temperature rise is associated with increased cardiovascular disease, dehydration, and heat stroke, while also geographically expanding the survival range for ticks and mosquitoes and exacerbating the spread of diseases and viruses like

zika, West Nile virus, dengue, malaria, and Lyme disease, among others.⁴⁵ Many heat-related conditions are especially dangerous for children,⁴⁶ the elderly, and the poor, and increased drought in some countries has already contributed to heightened malnutrition, especially for children. Increased flood occurrences have led to the spread of mold and other contaminants in water and food, in addition to the destruction of health facilities desperately needed during times of emergency. These are cases that many health workers deal with now, but the number of health workers that will be exposed to these issues will increase dramatically alongside these trends.

The health care workforce must respond to crises with direct patient services, but also to challenges by offering other services, such as knowledge-sharing and policy advocacy. Using first-hand knowledge of the implications of environmental hazards, organizations have put together resources for best practices. For example, the health professionals that authored much of the COP24 special report outlined how to build climate-resilient health systems and facilities, including products, technologies, and research, and also how to develop climate-informed programs across the sector. Many other professional groups have also convened to propose action for addressing the health risks associated with climate change and related environmental concerns⁴⁷—public knowledge and action that directly relates to environmental and social sustainability.

Due to the projected increase in demand for these services, four of the top five occupational categories in terms of employment growth projections from 2018 to 2028 are in health care and health services: health care support occupations (18.2 percent), personal care and service occupations (17.4 percent), health care practitioners and technical occupations (11.9 percent), and community and social service occupations (11.2 percent).⁴⁸ (See Table 3.)

Meanwhile, some of these occupations are currently among the lowest-paying jobs, making the sector financially unsustainable for workers. The median annual salary for home health aides and personal care aides was barely above \$24,000 in 2018.⁴⁹ Seventy-six percent of all women

TABLE 3

Four of the Top Five Fastest Growing Occupational Groups are in Health Services		
	<i>Projected Employment Growth, 2018-2028 (Percent)</i>	<i>Median Annual Wage</i>
Health Care Support Occupations	18.2	29,740
Personal Care and Service Occupations	17.4	24,420
Health Care Practitioners and Technical Occupations	11.9	66,440
Community and Social Service Occupations	11.2	44,960
Source: BLS OES 2018 data		

who provide adult home care services earn less than \$15 an hour.⁵⁰ Only 13 percent of workers in home-based health care settings have a pension plan, and only 24 percent have employer sponsored health insurance.⁵¹ As long as health service jobs continue to be low paying with few benefits, and often left out of basic labor protections, while demand for those services continues to increase, the sector itself is inherently unsustainable.

*Educators Are Green Workers.*⁵² The ability of any nation to care for and educate its youth in many ways determines the future health of civic, social, and economic outcomes. For each individual, quality education, and early childhood education in particular,⁵³ is a major determinant in emotional health and lifelong wealth potential. For communities and societies, education—to the extent that it is accessible to all children regardless of race, class and gender—is a driver of economic prosperity, crime reduction, and geopolitical stability. To build a sustainable society, education and educators are essential.

There are a number of unsustainable trends in child care and pre-K-12 education that could be ameliorated if these sectors were treated as vital in achieving a sustainable economy. The importance of early childhood care and education as a driver of long-term sustainability has been overlooked, to the point

of crisis. The average cost of child care and nursery school in U.S. cities has doubled since 2000,⁵⁴ and at least half of U.S. families report difficulty finding child care.⁵⁵ and for those who do have children, not having these options causes millions of parents to stay home instead of working—costing individuals in lost wages, and the economy in productivity.⁵⁶

The provisioning and infrastructure for education in America is another crucial element of generational sustainability that’s in need of serious investment. Pre-K-12 schools, mostly funded by state and local governments, have had deep cuts to operational budgets in the past ten years. Many states have not reached pre-Great Recession levels of funding,⁵⁷ Adequacy in funding for schools is deeply tied to a community’s wealth and property taxes, because local funding covers nearly half of the total financial support for Pre-K-12 schools—meaning that intense disparities already exist in public schools, and typically follow lines of race and class. For example, recent research has shown that, without adequate state and federal assistance, the funding gap between predominantly white and predominantly black schools amounted to \$23 billion.⁵⁸

Budget cuts have also hurt teachers’ salaries. Those educating the nation’s youth should be able to focus on how to best help students learn, rather than, for example,

worrying about how to find money for textbooks, or having to personally contract a substitute teacher in case of absence. According to a Department of Education survey, in the 2014–15 school year, 94 percent of public school teachers paid for school supplies without reimbursement.⁵⁹ Meanwhile, the average annual wage for preschool, primary, and secondary education teachers that year was \$55,500—a figure which has stayed the same or slightly declined, in real terms, over the past twenty years.⁶⁰ One survey showed that 55 percent of teachers are not satisfied with their salary, and nearly 20 percent of public school teachers—one in five—take on second jobs during the school year. It’s no wonder that historic teachers strikes occurred in the same states that have seen the biggest education budget and teacher salary cuts.⁶¹ In many of those same states, such as West Virginia and Oklahoma, state budgets have been further hurt by the decline of the fossil fuel industry, and school budgets have been sacrificed by too-low taxes on the industry—a major rally cry during strikes.⁶²

Lastly, educators are green workers because they interact directly with long-term environmental sustainability in two key ways. First, teaching environmental and civic stewardship and related topics such as ecology and climate change, and publishing resources for integrating environmental issues and climate change into curriculum, from Pre-K–12 to higher education, is critical to sustainability. The need to better embrace educators as green workers is underscored by the need to include more modules on climate change on the curriculum: currently, 86 percent of teachers say kids should learn about climate change while only 42 percent teach it.⁶³ Teaching these topics earlier and more robustly could certainly impact outcomes from individual behavior to future public policy.

Second, caring for and engaging with youth who are directly impacted by environmental issues and climate change, whether emotionally or physically, is also critical to the concept of sustainability. As Marnie Brady, an assistant professor of politics and human rights at Marymount Manhattan College, recently said, “the living conditions of their students are indeed the working conditions of their classrooms.”⁶⁴ As environmental stressors increasingly impact childrens’

home lives, so too will that stress become the setting in which teachers do their jobs. Teachers will increasingly need supplementary training in order to effectively identify, interact with, and ensure the safety of students dealing with depression, trauma and toxic stress—whether it’s related to housing instability, or other environmental and psychological impacts of climate change.⁶⁵

Gender and Racial Equity Are Necessary for a Sustainable Workforce

The definition of green jobs proposed in this report includes health care and education work—two fields disproportionately staffed by women. In the formal labor market, women comprise 75 percent of all health care practitioners, including doctors and technicians; 89 percent of health care support occupations, such as nurses and health aides; and over 73 percent of education, training, and library workers.⁶⁶ In preschool and kindergarten classrooms, 98 percent of teachers are women, and in elementary and middle school classrooms, 80 percent of teachers are women. Health care support workers—an occupation that makes, at the median, below-poverty-level wages for a family of four—are disproportionately women of color.⁶⁷ Nearly 36 percent of home health aides are black or African American, while black and African Americans comprise just over 13 percent of the total population.⁶⁸

Furthermore, in the household, women are disproportionately responsible for household labor and care. This type of work has long been seen as outside of the formal labor market, and thus is unpaid, but can impact a woman’s ability to fully participate in the labor market, while it’s also the work that makes all other work possible. And when domestic work is paid, as mentioned above, house cleaners, nannies, and home health care aides are paid among the lowest occupational wages, and enjoy among the least labor protections.

The current standard definition of green jobs—which is focused on energy production and distribution, and is comprised largely of manufacturing and construction work—heavily skews the green labor force as male. Given this current standard definition, any green jobs program could

incentivize shifting out of necessary care jobs into higher-carbon-intensity, production-oriented green ones—which is not a path to sustainability. A definition of green jobs for a sustainable economy would instead suggest that traditionally female-dominated health and educational jobs are, in fact, green jobs, and that they should be included in policies related to jobs that would promote strong labor protections, livable wages, and other standard benefits. To include these millions of workers in a vision of a sustainable economy is to acknowledge that this work is crucially important for society, and that it should be economically valued as such. This shift would go a long way toward gender and racial equity, and toward ensuring all workers green, family-sustaining jobs.

In sum, if we add green jobs for sustainability to standard green jobs in renewable energy, energy efficiency, and environmental management, we can take a broader view of what a sustainable workforce, and economy, might look like. Then policy can be designed to strengthen and support it.

Conclusion

Policy makers and practitioners, from federal agencies down to community groups, should seriously reconsider what activities are considered green. Just as energy efficiency workers help make society more environmentally sustainable, our nation's health care and education workers help make society more socially and economically sustainable. All of these workers can help lead the nation toward a more prosperous future, so long as they are accounted for in all green economy policies and programs.

In order to track progress on the path toward a sustainable economy, one crucial federal action is to measure green jobs. It's hard to measure them without standardized survey data because the range of activities one does in a job can include both sustainable/low-carbon and unsustainable/high-carbon inputs and outputs. In order to understand how market and policy changes are affecting the labor market for green jobs, Congress should reauthorize funding for BLS's Green Goods and Services survey. The BLS should clarify and expand upon the criteria for defining green jobs as discussed under this framework, identify and track new dimensions about jobs that could support additional

analyses about equity and geography, and streamline the processes for collecting this information from employers.

In addition, there must be opportunities for all workers to access robust job training pathways toward jobs that have, at least, the same salary that they have now, in order to encourage workers to move into sustainable green jobs. The green job guarantee component of the Green New Deal⁶⁹ aims to address issues of precarity, low wages, and pervasive unemployment in some communities, by providing training and good jobs to all who are willing and able. A federally funded and locally administered job guarantee program⁷⁰ would allow localities to address systemic inequalities both in the labor market and in green infrastructure for resilience and adaptation to climate change. The job guarantee should also be grounded in a framework of green jobs for a sustainable economy—a framework that aims to improve the working conditions in jobs that have been undervalued, including traditionally women's roles in the care and education sectors. Then those sectors would be more economically sustainable, but also environmentally sustainable, as they would offer good low-carbon alternatives to jobs in the extractive economy. Until we get there, though, the government should play an active role in mandating sustainability requirements in all policy, and in measuring progress. We don't have much more time to wait.

Acknowledgments

This report is a collaboration with Data for Progress and was supported by the Bernard L. Schwartz Rediscovering Government Initiative.

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Notes

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Appendix: Redefining Green Jobs for a Sustainable Economy

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Ecology: This circle focuses on the integration and interactions of humans with and within nature.

APPENDIX TABLE 1

Perspective	Aspects
Materials and Energy	<ul style="list-style-type: none"> Availability and Abundance Soil and Fertility Minerals and Metals Electricity and Gas Petroleum and Biofuels Renewables and Recyclables
Water and Air	<ul style="list-style-type: none"> Vitality and Viability Water Quality and Potability Air Quality and Respiration Climate and Temperature Greenhouse Gases and Carbon Adaptation and Mitigation Processes
Flora and Fauna	<ul style="list-style-type: none"> Complexity and Resilience Biodiversity and Ecosystem Diversity Plants and Insects Trees and Shrubs Wild Animals and Birds Domestic Animals and Species Relations
Habitat and Settlements	<ul style="list-style-type: none"> Topography and Liveability Original Habitat and Native Vegetation Parklands and Reserves Land-use and Building Abode and Housing Maintenance and Retrofitting

APPENDIX TABLE 1 CONTINUED

Perspective	Aspects
Built-Form and Transport	Orientation and Spread Proximity and Access Mass Transit and Public Transport Motorized Transport and Roads Non-motorized Transport and Walking Paths Seaports and Airports
Embodiment and Sustenance	Physical Health and Vitality Reproduction and Mortality Exercise and Fitness Hygiene and Diet Nutrition and Nourishment Agriculture and Husbandry
Emission and Waste	Pollution and Contamination Hard-waste and Rubbish Sewerage and Sanitation Drainage and Effluence Processing and Composting Recycling and Re-use

Economics: This circle focuses on how the economy and the production, use, and management of resources is organized around meeting the needs of all citizens.

APPENDIX TABLE 2

Perspective	Aspects
Production and Resourcing	Prosperity and Resilience Manufacture and Fabrication Extraction and Harvesting Art and Craft Design and Innovation Human and Physical Resources
Exchange and Transfer	Reciprocity and Mutuality Goods and Services Finance and Taxes Trade and Tourism Aid and Remittances Debt and Liability
Accounting and Regulation	Transparency and Fairness Finance and Money Goods and Services Land and Property Labour and Employment Taxes and Levies

APPENDIX TABLE 2 CONTINUED

Perspective	Aspects
Consumption and Use	Appropriate Use and Re-use Food and Drink Goods and Services Water and Electricity Petroleum and Metals Promotion and Dissemination
Labour and Welfare	Livelihoods and Work Connection and Vocation Participation and Equity Capacity and Productivity Health and Safety Care and Support
Technology and Infrastructure	Appropriateness and Robustness Communications and Information Transport and Movement Construction and Building Education and Training Medicine and Health Treatment
Wealth and Distribution	Accumulation and Mobilization Social Wealth and Heritage Wages and Income Housing and Subsistence Equity and Inclusion Re-distribution and Apportionment

Politics: This circle focuses on supporting an engaged civic involvement as well as the power dynamics around the organization, authorization, legitimation and regulation of a social life held-in-common.

APPENDIX TABLE 3

Perspective	Aspects
Organization and Governance	Legitimacy and Respect Leadership and Agency Planning and Vision Administration and Bureaucracy Authority and Sovereignty Transparency and Clarity
Law and Justice	Rights and Rules Order and Civility Obligations and Responsibilities Impartiality and Equality Fairness and Prudence Judgement and Penalty

APPENDIX TABLE 3 CONTINUED

Perspective	Aspects
Communication and Critique	Interchange and Expression News and Information Accessibility and Openness Opinion and Analysis Dissent and Protest Privacy and Respect
Representation and Negotiation	Agency and Advocacy Participation and Inclusion Democracy and Liberty Access and Consultation Civility and Comity Contestation and Standing
Security and Accord	Human Security and Defence Safety and Support Personal and Domestic Security Protection and Shelter Refuge and Sanctuary Insurance and Assurance
Dialogue and Reconciliation	Process and Recognition Truth and Verity Mediation and Intercession Trust and Faith Remembrance and Redemption Reception and Hospitality

Culture: This circle focuses on the continuation of the social meaning behind human practices, discourses, and material expressions over time, as well as processes for dealing with the uncomfortable intersections of identity and difference.

APPENDIX TABLE 4

Perspective	Aspects
Identity and Engagement	Diversity and Difference Belonging and Community Ethnicity and Language Religion and Faith Friendship and Affinity Home and Place
Creativity and Recreation	Aesthetics and Design Performance and Representation Innovation and Adaptation Celebrations and Festivals Sport and Play Leisure and Relaxation

APPENDIX TABLE 4 CONTINUED

Perspective	Aspects
Memory and Projection	Tradition and Authenticity Heritage and Inheritance History and Records Indigeneity and Custom Imagination and Hope Inspiration and Vision
Beliefs and Ideas	Knowledge and Interpretation Ideologies and Imaginaries Reason and Rationalization Religiosity and Spirituality Rituals and Symbols Emotions and Passions
Gender and Generations	Equality and Respect Sexuality and Desire Family and Kinship Birth and Babyhood Childhood and Youth Mortality and Care
Enquiry and Learning	Curiosity and Discovery Deliberation and Debate Research and Application Teaching and Training Writing and Codification Meditation and Reflexivity
Wellbeing and Health	Integrity and Autonomy Bodies and Corporeal Knowledge Mental Health and Pleasure Care and Comfort Inclusion and Participation Cuisine and Emotional Nourishment