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Job Creation for a Clean Jumpstart

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I. Introduction: Economic and Policy Context

While running for President, Joe Biden campaigned on a vision to rebuild our post-pandemic economy through infrastructure and clean energy investments to put millions of Americans to work. We released the original Clean Jumpstart plan**, in May 2020,** to provide a roadmap and policy recommendations for how to make this vision a reality. Now, government plans to boost the economy and address climate change are in progress. The American Jobs Plan and Families Plan would create millions of jobs through investment in infrastructure, home care, and a variety of other safety net supports for individuals and families. The moment of intersecting crises we're in demands big, bold solutions that meet the scale of these crises we face. The real risk is not going too big—it's going too small.

Government stimulus is sorely needed: more than a year into the pandemic recession, nearly 10 percent of Black workers are unemployed, and over 6 percent of all workers are unemployed. There are still more than 7 million fewer jobs than there were last June, and nearly 40% of all unemployed workers are long-term unemployed.[1] A majority of those out of work have no college degree. In addition, there are 5 million fewer people in the labor force than pre-pandemic, including 3 million women who left the labor force since last February, and 2 million men.[2]

Decarbonizing the economy in tandem with a full, job centered green recovery, will require many different plans to be executed at all levels of government and society. That's why, this March, Data for Progress and Evergreen Action released the Clean Jumpstart 2021 report that offers 39 policy priorities for how to carry out our existing commitments, while increasing ambition and creating good jobs that Americans desperately need, in communities that need them most. All components of this plan are popular with likely voters.[3] The Clean Jumpstart 2021 plan represents how a bold climate investment package, like the American Jobs Plan, could tackle the climate crisis and build a clean energy economy.

The Clean Jumpstart 2021 plan would invest a total of **$2.3 trillion** over four years.[4] Some investments would create jobs more or less immediately, while others will take longer to realize full job-creation effects. Therefore, in this memo, we estimate that the plan would create an average of **2.7 million jobs annually for the first five years.** But the job benefits of the plan don't end there. The policies in Clean Jumpstart would also create up to 960,000 jobs annually for five years following (year 6-10 after investments begin). Approximately 40 percent of all jobs created would be "direct" jobs, or employment working directly toward these policy goals, and the rest would be due to additional work generated along supply chains and in communities due to the multiplied impacts of increased demand. We also break down the average annual jobs created by the main policy areas highlighted in the report. In the first five years of investment, the plan would generate the following number of jobs, annually, on average:

- **256,000 jobs** in clean energy deployment
- **1.2 million jobs** in green infrastructure
- **198,000 jobs** in clean and competitive manufacturing
- **464,000 jobs** in agriculture and natural resources
- **81,000 jobs** in technology innovation
- **524,000 jobs** in workers and communities

A bulk of jobs created in years 6-10 would be in policy areas that take more time for investment to translate to job growth. For example, we estimate that components of the clean energy deployment plan (clean energy tax credits, setting up a green bank, rural electrification, and more), will continue to create up to 210,000 jobs per year following the initial five-year period. Likewise, we assume that the entire clean and competitive manufacturing plan will take ten years to realize full job creation potential, and thus will continue to generate nearly 200,000 jobs per year, on average, in the following five-year period. Conversely, if all investments in workers and communities are outlayed in four years, those jobs will be created quickly (eg. for a Climate Corps or remediation jobs), with funding flowing directly to workers, and all job creation impacts could be seen within five years from when investment begins.

II. Methodology and Notes

MAIN SOURCES

Estimating job creation in the green economy would not be possible without the foundational work of a number of researchers at the Political Economy Research Institute (PERI) at UMass Amherst. Two seminal studies that provide the basis for most of the work in this memo include the following, and a number of others are cited throughout.

- "Employment Impacts of Proposed U.S. Economic Stimulus Programs: Job Creation, Job Quality, and Demographic Distribution Measures" by Robert Pollin, Shouvik Chakraborty, and Jeannette Wicks-Lim. This paper models the THRIVE Agenda, with many overlapping policies and features as the Clean Jumpstart plan this memo models.
- "Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model" by Heidi Garret-Peltier. This paper focuses on renewable energy and energy efficiency, and synthesizes many other relevant estimates that existed at the time it was published.
- These papers rely on input-output data, which, as Garret-Peltier explains, "show the inputs used by each industry, the outputs produced by each industry, and the relationship between industry output and final demand among various users," based on extensive surveys conducted by the Bureau of Economic Analysis every five years.[5] Then, based on existing data on labor and capital costs, one can extract the employment "multipliers" associated with a given investment (or any other source of demand) in one of those industries, and the ripple effects that is likely to create on demand and employment in other industries. Those ripple effects include up- and downstream impacts on jobs, including jobs in sectors that make component parts for your end-use product, or "*indirect*" jobs, in addition to "*induced*" jobs created through increased consumption of new job holders.

TIME FACTOR

Multipliers provide an estimate for how many jobs will be created by a certain amount of investment. For this memo we assume that all investments will be deployed over a four year period.[6] However, full job creation impacts will be realized within either a five-year or ten-year timeframe. The method for

adjusting for the number of jobs created over time is to differentiate between total "job years" and annual jobs. For example, the investment of **$2.3 trillion** over four years through the Clean Jumpstart Plan will create over **26 million "job years**." However, it makes more sense to think about the impact on an average annual basis as **approximately 2.7 million jobs per year** (for the first five years), because it is highly unlikely for 26 million different individuals to be given a job for one year, each. There is likely to be some mix of new employment going to full-time workers, some going to contract and temporary workers, and there will inevitably be turnover during that time. Since it is impossible to estimate the level or rate of turnover, we stick with average annual job creation as the relevant outcome.

ARE THESE ESTIMATES UPPER OR LOWER BOUNDS?

Employment multipliers assume that prices of inputs and outputs do not change over time, nor do the factors of production, since they are based on input-output surveys conducted at one period of time. In reality, since inputs and outputs do change over time, it's important to consider in what ways that would impact the viability of job projection results. Two main factors that are worth mentioning at a very high level are wages and technology.

Due to prevailing wage provisions and other wage standards, in addition to potential increases in union membership, wages over the duration of these investments may increase. That would mean that multipliers could actually be smaller than stated here, because the *same amount of money* would create *fewer* jobs. Due to the potential for wage increases over time, these estimates are an upper bound of the true number of jobs likely to be created.

Technology, and thus productivity of labor and capital, is likely to improve over time, especially given specific investments aimed at such improvements that are included in this plan. This means that costs of production overall may decrease, and the *same amount of investment* could lead to *more* jobs, making these estimates a lower bound for the true number of jobs likely to be created.[7]

Without knowing the relative probability of wage increases vs. capital cost decreases, or the relative magnitude of either of those effects, it's hard to say how to evaluate where these estimates will fall in a distribution of outcomes. But since these two major factors in production that could change over time—wages and technology—happen to work in opposite directions, the numbers presented below are unlikely to represent either an upper or lower bound on the true effect of investment, but rather are likely to lie somewhere in between.

III. Job Estimates by Policy Focus Area

CLEAN ENERGY DEPLOYMENT

$60 billion
State Clean Energy Deployment

$250 billion
Clean Energy Tax Incentives

$100 billion
Clean Energy Accelerator/ Green Bank

$80 billion
Electric Vehicle Tax Credit

$21 billion
USDA Clean Energy Loan Program/ Rural Electrification

$6 billion
DOE Loan Guarantee Program

$10 billion
Green Real Estate Lending for Small Businesses

SUSTAINABLE INFRASTRUCTURE

$225 billion
Building Retrofit Incentives

$220 billion
State Revolving Loan Funds for Clean & Safe Drinking Water

$210 billion
Transit & Rail Transportation

$30 billion
Rural Broadband

$12 billion
Grid Infrastructure & Electricity Reliability

$40 billion
Transmission Planning & Financing

$45 billion
State Block Grants for Energy Efficiency & Community Development

$36 billion
EV Charging Infrastructure

$120 billion
Green Affordable Housing

$20 billion
Flooding & Storm Protections

CLEAN & COMPETITIVE MANUFACTURING

$30 billion
Advanced Energy Manufacturing Leadership

$12.5 billion
Domestic Manufacturing Conversion Grants

$250 billion
Clean Cars for Clunkers

$18 billion
Federal Advanced Manufacturing & Industrial Policy

$22 billion
Direct Support for Industrial Decarbonization

$5 billion
Advanced Technology Vehicle Manufacturing Program

AG. & NAT. RESOURCES

$50 billion
Soil Carbon & Climate-smart Agriculture

$15 billion
Rural Water Resources

$30 billion
Forest Health & Wildfire Resilience

$20 billion
Public Lands & Ecosystems Restoration

TECHNOLOGY INNOVATION

$100 billion
Clean Energy RD&D

$20 billion
Carbon Removal & Industrial Innovation

$20 billion
ARPA-Ag & Agricultural Innovations

WORKERS & COMMUNITIES

$.1 billion
Equity Mapping Initiative

$70 billion
Civilian Climate Corps

$18 billion
Environmental Remediations Jobs

$15 billion
EPA Environmental Justice Small Grants Program

$15 billion
Black Lung Disability Trust Fund

$60 billion
GI Bill of Rights for Energy Workers

$12 billion
State Buy-outs for Fossil Fuel- Dependent Communities

$30 billion
Superfund Cleanup & Brownfields Redevelopment

INTERNATIONAL ACTION

$90 billion
Green Climate Fund & Other International Climate Investment Communities

CLEAN ENERGY DEPLOYMENT

Support states, companies, communities, and individuals across the country to increase clean energy production and demand with $530 billion total investment over the duration of investment. Together with a Clean Electricity Standard (CES), according to the plan, "these policies will unlock the rapid transformation necessary for 80% clean electricity by 2030 and 100% by 2035," and more.

These investments would create **256,000 jobs** annually in the first five years, on average, and 210,000 in the five-year period that follows. Jobs created would be related to increased production and deployment of renewable energy and manufacturing of electric vehicles. It is worth noting that spending on clean energy averages a jobs return on investment that's six times higher than spending on fossil fuels.[8]

Jumpstart Item	Total Expenditure (millions)*	Average Annual Expenditure (millions)	Average Annual Job Creation (in years 1-5)	Average Annual Job Creation (in years 6-10)
State Clean Energy Deployment	$60,000	$15,000	34,800	34,800
Clean Energy Tax Incentives	$250,000	$25,000	80,000	80,000
Clean Energy Accelerator/Green Bank	$100,000	$25,000	69,500	69,500
Electric Vehicle Tax Credit	$80,000	$16,000	46,400	0
USDA Clean Energy Loan Program and Rural Electrification	$21,000	$5,250	14,595	14,595
DOE Loan Guarantee	$6,000	$1,500	4,170	4,170
Green Lending for Small Businesses	$10,000	$2,500	6,950	6,950
TOTALS, CLEAN ENERGY	**$527,000**	**$90,250**	**256,415**	**210,015**

*Note: All investments would span 4 years, except for clean energy tax incentives, which would span 10 years, and the electric vehicle tax credit, which would span 5 years.

It has been estimated that there are approximately 1.3 million clean energy production workers in the United States (as of 2019). From that baseline, the addition of nearly 260k jobs would boost clean energy employment by nearly 20% per year. However, renewable energy jobs and investment have declined during the pandemic recession, so these investments are even more critical for staying on track to meet U.S. climate goals and green job growth.

A majority of these jobs would be in sectors like construction, machinery and metal manufacturing, computer technology, transportation, management, and other services.[9] According to a 2019 Brookings analysis, "This sector not only concentrates workers involved in actual energy production—such as power plant operators and wind turbine technicians—but also workers involved in the construction, operation, and maintenance of the electric grid, such as power line installers and repairers, electricians, solar photovoltaic installers, and utility meter readers… In addition, the sector employs large numbers of office clerks, general and operations managers, and other business operations specialists."

While job estimates assume a four year investment timeline, it is likely that a bulk of new jobs are created in the nearer term and lead to ongoing employment, as funding gets deployed, production ramps up, and the industry grows. There is already evidence for success for a number of the proposed policies. For example, grants and loans through the DOE during the Recovery Act provided approximately $12 billion per year, supporting 40,000-50,000 new jobs per quarter, in the first two years alone. And the Investment Tax Credit has already put the country on a higher trajectory in terms of renewable energy deployment and job creation. Investing in renewable energy technology and development, as Clean Jumpstart recommends, could go a long way toward lowering technology costs, which would accelerate renewable capacity by more than two-fold and further increase employment expectations.

SUSTAINABLE INFRASTRUCTURE

Invest $913 billion total investment in cleaner buildings, safer storm and drinking water, efficient transportation, rural broadband, and a more resilient energy grid, all working to make long-needed infrastructure upgrades.

These investments would support **1.2 million jobs** per year on average for the first five-year period, and an additional 470,000 jobs per year on average for the following five-year period. Jobs created would be in a variety of occupations, the most prevalent of which are related to transportation and material moving, construction, management, education, and office and administrative support.

Jumpstart Item	Total Expenditure (millions)	Average Annual Expenditure (millions)	Average Annual Job Creation (in years 1-5)	Average Annual Job Creation (in years 6-10)
Building Retrofits	$225,000	$56,250	603,000	0
State Loan Funds, water	$220,000	$55,000	161,700	161,700
Transit and Rail	$210,000	$52,500	149,100	149,100
Rural Broadband	$30,000	$7,500	15,150	15,150
Grid Infrastructure	$12,000	$3,000	6,540	6,540
Transmission Tax Credit, planning and financing	$40,000	$10,000	8,400	8,400
State Energy Efficiency and Community Development Grants	$45,000	$11,250	35,325	35,325
EV Charging Infrastructure	$36,000	$9,000	120,000	0
Green Affordable Housing	$120,000	$30,000	80,400	80,400
Flooding and Storm Protections	$20,000	$5,000	13,750	13,750
TOTALS, SUSTAINABLE INFRASTRUCTURE	**$913,000**	**$239,500**	**1,193,365**	**470,365**

Many of these proposals would lead directly to energy efficiency improvements for buildings and products, more than half of these jobs are in construction, more than 20 percent are in professional services, and more than 70 percent of energy efficiency jobs are in small businesses. And, again, we have evidence of strong job growth from energy efficiency investments during the 2009 Recovery Act, the Energy Efficiency and Conservation Block Grant provided $2.7 billion in funding, and created nearly 63,000 jobs.

Grid, broadband infrastructure, and storm protections would mostly create jobs for engineers, technicians, and construction workers. Public transit, which has been further harmed by the pandemic, has long lacked adequate investment across the country, receiving a D- grade from the American Society of Civil Engineers due to poor conditions, lack of funding, and lack of access for up to 45% of Americans, although investment has a high return on a diverse array of direct jobs.

The plan proposes a $120 billion investment in building and retrofitting public and affordable housing. As we have previously estimated, an even more robust Green New Deal for Public Housing plan would cost a total of $170 billion to improve living conditions for 2 million residents while creating more than 240,000 jobs per year over a ten-year time horizon.

CLEAN & COMPETITIVE MANUFACTURING

This plan would invest $340 billion to decarbonize the manufacturing sector while, at the same time, growing its capacity to support the clean energy transition by supplying components for electrified transportation, batteries, and other technologies. Funding would increase existing manufacturing support, including NIST's Manufacturing Extension Partnership (MEP) and other assistance programs to accelerate both industrial decarbonization and U.S. competitiveness and job growth. It will also reauthorize clean manufacturing tax credits, which, during the Recovery Act, "supported tens of thousands of jobs building 183 projects expanding domestic clean energy manufacturing capacity across 43 states," according to the report.

This plan would create an average of **nearly 200,000 jobs** annually in the manufacturing sector and in manufacturing communities, which have lost more than a half million jobs since before the coronavirus recession began.[10] The plan, which focuses on upgrading and upskilling existing manufacturing activities to be more advanced, has the potential to raise wages by up to 20 percent, while increasing productivity and value added to the sector overall.[11] In addition, dramatically increasing demand for clean products like electric vehicles would spur private investment in production and create even more jobs to new and existing factories.

Jumpstart Item	Total Expenditure (millions)	Average Annual Expenditure (millions)	Average Annual Job Creation (in years 1-5)	Average Annual Job Creation (in years 6-10)
Advanced and Clean Tech Manufacturing	$30,000	$7,500	15,000	15,000
Manufacturing Conversion Grants: Renewable energy, energy efficiency, and EV	$12,500	$3,125	2,229	2,229
Clean Cars for Clunkers	$250,000	$50,000	175,000	175,000
Industrial Policy	$18,000	$4,500	Negligible/ undetermined	Negligible/ undetermined
Industrial Decarbonization	$22,000	$5,500	4,620	4,620
Advanced Tech Vehicle Manufacturing	$5,000	$1,250	725	725
TOTALS, CLEAN & COMPETITIVE MANUFACTURING	**$337,500**	**$71,875**	**197,574**	**197,574**

Notes:

- Clean Cars for Clunkers estimates are modeled after Clean Cars for America, introduced by Leader Schumer in 2019, which contains funding for charging infrastructure and manufacturing conversion as seen elsewhere in the Clean Jumpstart plan. I've subtracted out job creation estimates that overlap elsewhere in this memo (eg. charging infrastructure).
- Investment in Clean Cars for Clunkers would be distributed over a five-year period, rather than the four-year time horizon of most investments in this plan.
- Funding for industrial policy may not create *new* jobs, but will facilitate growth in domestic production over the long term.

AGRICULTURE & NATURAL RESOURCES

The Jumpstart plan proposes $115 billion in total investment to dramatically upgrade the health of America's food system, harness nature's climate healing potential - from soil carbon sequestration to ecosystem restoration, and protect families and farmers.

The plan would generate **464,000 average annual jobs**, while drawing down carbon and making communities, especially in agricultural regions, more resilient to climate change and environmental degradation. There is a high return on investment for agriculture and ecosystem restoration jobs since the output is very labor intensive, and investments would create millions of good jobs for a workforce that's diverse in race, gender and age.

Jumpstart Item	Total Expenditure (millions)	Average Annual Expenditure (millions)	Average Annual Job Creation (in years 1-5)*
Soil carbon and climate-smart agriculture	$50,000	$12,500	238,000
Rural Water Resources	$15,000	$3,750	42,300
Forest Health and Wildlife	$30,000	$5,000	92,000
Public Lands and Ecosystem Restoration	$20,000	$5,000	92,000
TOTALS, AGRICULTURE AND NATURAL RESOURCES	**$115,000**	**$26,250**	**464,300**

*We assume all jobs created with these investments will take place within the first five-year period, and few more will be created after that without follow-on funding.

TECHNOLOGY INNOVATION

Investing $140 billion in technology innovation over 4 years would spur clean energy research and development, diversify opportunities to decarbonize energy and industry, explore commercialization for carbon sequestration, and advance agricultural research, development, and clean industry partnerships.

This would create an average of **81,000 jobs** per year for ten years, retrofitting existing factories and supply chains, and in designing, researching, testing, engineering, operating, and maintaining those new operations. Since the innovation lifecycle takes time to come to commercialization, it is likely that jobs will be created steadily over the ten-year period.

Jumpstart Item	Total Expenditure (millions)	Average Annual Expenditure (millions)	Average Annual Job Creation (in years 1-5)	Average Annual Job Creation (in years 6-10)
Clean Energy R&D	$100,000	$25,000	60,700	60,700
Carbon Removal	$20,000	$5,000	3,800	3,800
ARPA-Agriculture	$20,000	$5,000	16,200	16,200
TOTALS, TECHNOLOGY INNOVATION	**$140,000**	**$35,000**	**80,700**	**80,700**

The bulk of this investment would expand DOE's capacity to support innovation, especially through its new Office of Technology Transitions, and invest in state level innovation networks that include research institutions and universities, while offering financial incentives more broadly. As laid out in our recent Climate Innovation memo, these clean energy investments should focus on a) expanding public support and engagement in development and integration of new clean energy technologies, b) development that could rapidly and reliably reduce greenhouse gas emissions, and c) combatting historical environmental injustice through targeted pollution reduction, and ensure opportunities presented by these investments are inclusive.

WORKERS & COMMUNITIES

The Clean Jumpstart plan acknowledges that achieving environmental justice requires the Justice40 commitment in addition to a variety of other initiatives. That's why the plan recommends commiting $220 billion in total investment into workers and communities.

This investment would create **524,000 jobs per year**, in addition to immeasurable positive impacts on community and worker health and well-being. The biggest single component in this category is the Civilian Climate Corps (CCC) which could put more than 300,000 Americans to work per year, for five years. This would train workers for career-track jobs with good pay and the option to join a union, and would provide accessible, meaningful work to those of all backgrounds and capabilities. There are quite high job-returns on investment in corps programs, as well as in investing in environmental justice communities, remediation, and cleaning up superfund sites. All average at least 15 jobs per $1 million in spending, are well-targeted to under-invested and low-income areas where spending goes farther and creates bigger impacts for communities that need it most.

Jumpstart Item	Total Expenditure (millions)	Average Annual Expenditure (millions)	Average Annual Job Creation (in years 1-5)*
Equity mapping	$100	$25	Negligible/ undetermined
Civilian ClimateCorps	$70,000	$17,500	322,000
Remediation	$18,000	$4,500	58,320
EPA Environmental Justice Grants	$15,000	$3,750	46,200
Black Lung Disability, GI Bill of Rights for energy workers	$75,000	$18,750	Negligible/ undetermined
Buy outs of fossil fuel-dependent communities	$12,000	$3,000	Negligible/ undetermined
Superfund cleanup	$30,000	$7,500	97,200
TOTALS, WORKERS AND COMMUNITIES	**$220,100**	**$47,525**	**523,720**

*We assume all jobs created with these investments will take place within the first five-year period, and few more will be created after that without follow-on funding.

Note:

- Equity mapping is essential for properly targeting investment and being able to fulfill the Justice40 commitment, although it is a largely bureaucratic initiative that would likely engage existing workers housed in existing government jobs.
- Black lung disability funding would extend existing health care support for former coal miners, and therefore is not likely to generate new activity.
- A GI Bill of Rights would create a wage replacement program to ensure adequate pay and other labor market support for transitioning energy workers. This may stimulate labor demand for some, while other fossil fuel workers may opt to retire rather than starting a new career. Overall it is hard to estimate the direct impact (and therefore indirect or induced jobs) from this program, compared with other factors that determine fossil fuel workers' labor market decisions. Therefore we are deeming it "negligible" for the sake of these estimates.
- Buy outs of fossil-fuel dependent communities would provide a percentage of full replacement for revenue that states currently get for leasing land for fossil fuel production, however there is no reinvestment condition detailed in the plan.

INTERNATIONAL ACTION

The climate crisis is an international issue that demands global solutions. The global north, America in particular, having contributed an outsized portion of global warming pollution, must take outsized responsibility in solutions. As the report states "The Biden administration and Congress have the opportunity to assert American leadership in a new era of global climate collaboration, with a transformative investment in international action." Providing funding for "developing" countries to have access to their own climate solutions will potentially create demand for American made products, although the job creation impact is currently undeterminable.

EQUITY AND DEMOGRAPHICS

Some components of the plan - affordable housing, community grants, public transit, and rural broadband, would be more clearly targeted toward low-income communities. But as the report highlights, in order for jobs to truly benefit communities, and ensure that all new jobs are good jobs, "these federal investments must also be accompanied by labor standards that ensure high quality, family wage jobs building the American clean energy economy. This includes strong Buy American and Davis-Bacon prevailing wage requirements, and provisions that promote utilization of project labor agreements and community benefits agreements."

Demographic considerations for direct jobs created are below. Note that while direct jobs should be diversified, many induced jobs are created in services and retail goods, which are more gender and racially diverse than energy jobs are currently.

GENDER: Jobs in clean energy and energy efficiency are very gender segregated. While women comprise nearly half of the workforce, only 1 in 5 renewable energy workers are women, and slightly more are

in energy efficiency. "Green" sectors, as typically defined, that are currently most inclusive of women include farmland conservation, ecosystem restoration, and agricultural research and development. As we've written previously, implementing policies that support low-carbon work women already do and investing in care infrastructure are needed for equitable climate policy that does not widen gender-based inequalities.

RACE: Latinx workers are overrepresented in almost every renewable energy and energy efficiency sector except for high-efficiency automobiles and industrial efficiency. In sectors largely composed of work in construction, like building retrofits, Latinx workers are overrepresented (more than 30% of workers doing building retrofits are Latinx). They also outpace national share of employment in agriculture and land restoration.[12]

Black workers are underrepresented in all spaces except for the auto industry, comprising 13.4% of high-efficiency auto work. Black workers comprise slightly more than 6% of renewable energy jobs, despite comprising more than 11% of the workforce overall, and comprise less than their national share in agriculture and land restoration.[13]

EDUCATION: Workers with a high school degree are overrepresented in renewable energy and energy efficiency jobs — comprising 40-50% of all energy efficiency and renewable energy jobs despite making up 35% of the workforce. Boosting these jobs will be well-targeted for the current recession in which most unemployed workers have no college education.

Appendix:

Jumpstart Item	Multipliers			Job Estimates			Total Job Years
	Direct	Indirect	Induced	Direct	Indirect	Induced	
State Clean Energy Deployment	3.9	3.1	4.6	234,000	186,000	276,000	696,000
Clean Energy Tax Incentives*	3.2 (total)						800,000
Green Bank	5.7	2.7	5.5	570,000	270,000	550,000	1,390,000
Electric Vehicle Tax Credit	2.9 (total)						232,000
USDA Clean energy loan program/rural electrification	5.7	2.7	5.5	119,700	56,700	115,500	291,900
DOE Loan Guarantee	5.7	2.7	5.5	34,200	16,200	33,000	83,400
Green Lending for Small Businesses	5.7	2.7	5.5	57,000	27,000	55,000	139,000
Building Retrofits	4.7	4	4.7	1,057,500	900,000	1,057,500	3,015,000
State Loan Funds, water	5.9	3.4	5.4	1,298,000	748,000	1,188,000	3,234,000
Transit and Rail	6.4	3.5	4.3	1,344,000	735,000	903,000	2,982,000
Rural Broadband	2.5	3.6	4	75,000	108,000	120,000	303,000
Grid Infrastructure	3.5	2.9	4.5	42,000	34,800	54,000	130,800
Transmission Tax Credit, Planning, Financing	4.2 (total)						168,000
State Energy Efficiency and Community Development Grants	7.2	2.85	5.65	177,750	45,000	123,750	346,500
EV Charging Infrastructure**	6 (total)						600,000
Green Affordable Housing	4.6	4.2	4.6	552,000	504,000	552,000	1,608,000
Water/Wastewater	5.9	3.4	5.4	59,000	34,000	54,000	147,000
Inland Waterways	4	3.9	4.9	40,000	39,000	49,000	128,000
Advanced Energy Manufacturing	10 (total)						300,000
Domestic Manufacturing Conversion Grants: RE, EE, storage	2.7	0.7	0.2	11,248	2,916	833	14,998
Domestic Manufacturing Conversion Grants: Industrial Efficiency	3	1	0.2	12,498	4,166	833	17,497
Domestic Manufacturing Conversion Grants: EV	1.4	1.3	0.2	5,832	5,416	833	12,081
Clean Cars for Clunkers	5.5	3	5.5	1,375,000	750,000	1,375,000	3,500,000

Jumpstart Item	Multipliers			Job Estimates			Total Job Years
	Direct	Indirect	Induced	Direct	Indirect	Induced	
Industrial Decarbonization	3	1	0.2	66,000	22,000	4,400	92,400
Advanced Technology Vehicle Manufacturing	1.4	1.3	0.2	7,000	6,500	1,000	14,500
Soil Carbon and Climate-Smart Agriculture	14.1	4.9	4.8	705,000	245,000	240,000	1,190,000
Rural Water Resources	5.5	3.3	5.3	82,500	49,500	79,500	211,500
Forest Health and Wildlife	13.2	3.4	6.4	19,800	5,100	9,600	34,500
Public Lands, Ecosystem Restoration	13.2	3.4	6.4	264,000	68,000	128,000	460,000
Clean Energy R&D***	1.29	6.68	4.17	129,000	668,000	417,000	1,214,000
Carbon Removal****	3.9 (total)						76,000
ARPA-Ag	6.9	3.8	5.5	138,000	76,000	110,000	324,000
Civilian Climate Corps	13.2	3.4	6.4	924,000	238,000	448,000	1,610,000
Remediation	7.5	2.9	5.8	135,000	52,200	104,400	291,600
EPA Environmental Justice Grants	7.9	2	5.5	118,500	30,000	82,500	231,000
Superfund Cleanup	7.5	2.9	5.8	225,000	87,000	174,000	486,000

SOURCES & NOTES:

Estimates in this table refer to the total number of jobs created throughout the entire duration of investments. For annual average estimates, see in-text tables.

All multipliers are derived from Robert Pollin, Shouvik Chakraborty, and Jeannette Wicks-Lim 2021, except those marked:

*Clean Energy Tax Incentives estimates are derived from NRDC research.

**EV Charging Infrastructure estimates are derived from Data for Progress research.

***Research and Development estimates are derived from EPI research.

****Carbon Removal estimates are derived from Rhodium Group research.

ENDNOTES

1. BLS data and author's calculation. Accessed July 2021. https://www.bls.gov/web/empsit/cpseea36.htm
2. BLS data, seasonally adjusted, reflects the difference between February 2020 and April 2021. Accessed May 2021. https://www.bls.gov/webapps/legacy/cpsatab16.htm
3. "Memo: A Clean Jumpstart To Rebuild America's Economy Public Opinion Polling And Analysis," Data for Progress, May 2020, https://www.dataforprogress.org/memos/clean-jumpstart-polling
4. With the exception of 3 policies that would outlay investments over longer time horizons: clean energy tax incentives would be outlayed over 10 years, and the EV tax credit and Clean Cars for Clunkers would carry out investments of a 5-year period.
5. Heidi Garrett-Peltier, "Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model," Economic Modelling, Volume 61, 2017, 439-447.
6. With exception of three policies: clean energy tax credits (10-year duration), electric vehicle tax credits, and clean cars for clunkers (both a 5-year duration).
7. I am not assuming that increased productivity would increase wages since decades of evidence show a faulty or absent relationship between these factors. https://www.epi.org/productivity-pay-gap/
8. Garrett-Peltier 2017, Table 5.
9. Garrett-Peltier 2017.
10. This reflects the difference between April 2021 and February 2020 manufacturing employment, according to BLS data https://www.bls.gov/iag/tgs/iag31-33.htm#workforce
11. "In 2016, advanced manufacturing jobs paid an average salary of $65,600 per year, $11,800 more than the $53,800 paid to other workers in the sector," according to a Policy Matters Ohio analysis of QCEW data, https://tcf.org/content/report/manufacturing-high-wage-ohio/
12. Thrive estimates.
13. Ibid.

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