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U.S. STATE-LEVEL STUDY

Employment Impacts for *Ohio* of Recent U.S. Clean Energy, Manufacturing, and Infrastructure Laws

Job Creation, Job Quality, and Demographic Distribution Measures for:

- **BIL**—*Bipartisan Infrastructure Law*
- **IRA**—*Inflation Reduction Act*
- **CHIPS**—*Creating Helpful Incentives to Produce Semiconductors*

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Source Material and Methodology for Generating Results in Tables

In September 2023, we published the study *Employment Impacts of New U.S. Clean Energy, Manufacturing, and Infrastructure Laws.* This study reported estimates on job creation, job quality, and workforce demographics resulting from the BIL (Bipartisan Infrastructure Law), IRA (Inflation Reduction Act), and CHIPS (Creating Helpful Incentives to Produce Semiconductors). We now provide state-level companion studies to this September 2023 national-level study for four states, Colorado, Michigan, Ohio, and Oregon.

These four state-level studies follow the same basic methodology as our September 2023 national study. But there are three areas where we have needed to further specify and adjust our estimating methodology, to take account of state-level specific considerations with BIL, IRA, and CHIPS. These three areas are:

1. Estimating each state's share of the overall national level of BIL, IRA, and CHIPS expenditures;
2. Estimating the level of economic activity that will take place within each state's economy, as derived from each state's share of total expenditures resulting from BIL, IRA, and CHIPS. This is the measure of "state content," versus purchases of imported goods coming from outside the state resulting from BIL, IRA, and CHIPS expenditures; and
3. Estimating job characteristics at the state-specific level rather than a national level.

We begin this methodological discussion by addressing the first two state-specific considerations. Our expanded discussion on estimating job characteristics follows on pp. 5–6. The remaining sections of this methodological discussion are identical to that which we provided in the September 2023 national-level study.

State-level Budget Estimates for BIL, IRA, and CHIPS

Our September 2023 study provides estimates for the overall U.S. economy of expenditure levels for BIL, IRA, and CHIPS. In the Appendix to that study, we also estimate expenditure levels on a line-item basis for all BIL, IRA, and CHIPS programs.

For our four state-level studies, we use separate approaches for estimating expenditures at the state level for BIL, IRA, and CHIPS respectively. These differences in estimating methods reflect both differences in the ways the separate programs are designed to allocate their overall funding as well as the amount of information that has become available on actual investment activity generated by the three programs.

IRA Spending Estimate

We generated IRA-based funding at the level of individual states—and for Colorado, Michigan, Ohio, and Oregon in particular—based on a simple formula. That is, we derive each state's share of overall IRA expenditure levels as an equally weighted average of the state's share of the overall U.S. population and its share of overall U.S. GDP. Formally:

State share of overall IRA investment spending =
((state population/U.S. population) + (state GDP/U.S. GDP))/2.

This formula takes account of both the share of economic activity in each state as well as its share of overall population. It also reflects a broader assumption that IRA-supported investment spending is targeted to be distributed fairly evenly across all U.S. states.

Methodology Table 1 below reports on the results of these spending share estimates by state for the IRA.

BIL Spending Estimate

The White House provides a funding tracker for all BIL activity at the state level at Build.gov: https://www.whitehouse.gov/build/resources/state-fact-sheets/. This provides the most extensive reporting of ongoing announced and awarded BIL funding support. To estimate each state's share of BIL funding through the 5-year life of the program, we first calculated the actual share of funding received by Colorado, Michigan, Ohio, and Oregon as of August 2023. This date corresponds with the date of U.S. economy-wide figures that we utilized in our September 2023 study.

In fact, the percentages of funding for our four states generated through this set of calculations closely mirrors the percentages generated by the formula we described above in calculating state-level shares of IRA funding—i.e. the weighted average of each state's share of both U.S. GDP and U.S. population. We can see this in Methodology Table 1 below. Thus, as the table shows, the respective shares of BIL spending by state using the White

METHODOLOGY TABLE 1. Estimated Expenditure Shares for Colorado, Michigan, Ohio, and Oregon of Overall U.S. Economy-wide BIL, IRA, and CHIPS-based Spending

	BIL Spending	IRA Spending	CHIPS Spending
Colorado	1.8%	1.7%	0.25%
Michigan	2.7%	2.8%	0.0%
Ohio	3.4%	3.1%	8.0%
Oregon	1.2%	1.3%	10.5%

Sources: See text discussion above.

House figures are 1.7 percent for Colorado, 2.8 percent for Michigan, 3.1 percent for Ohio, and 1.3 percent for Oregon. With the GDP and population-weighted ratios that we applied in estimating IRA spending shares, the figures are nearly identical for Colorado, Michigan, and Oregon, at 1.8 percent, 2.7 percent, and 1.2 percent respectively. The difference in the ratios is slightly larger for Ohio, at 3.4 percent with our calculation using the White House spending figures versus 3.1 percent using the weighted average of Ohio's population and GDP shares. But this 0.3 percentage point difference—3.1 versus 3.4 percent—is still negligible for the purposes of our overall calculations of employment impacts. As such, the close correspondence between these two sets of ratios provides support as to the reliability of the spending shares by state that we generated based on the spending figures reported by the White House. We therefore applied the BIL spending shares by state derived from the White House figures to estimate each of our four state's share of overall BIL spending over the 5-year life of the program.

CHIPS Spending Estimate

A substantial share of the overall CHIPS public funding for semiconductor fabrication grants has been allocated as of 5/30/24. Specifically, according to figures from the Semiconductor Industry Association (SIA), as of 5/30/24, there have been 18 funding allocations announced, totaling to $29.5 billion in public support.[1] Overall public funding support to be provided through CHIPS for semiconductor fabrication grants is $39 billion. Thus, as of 5/30/24, roughly 76 percent of total public funding has been allocated. We can use the figures on public CHIPS funding to date received, respectively, within the Colorado, Michigan, Ohio, and Oregon state economies as one basis for estimating overall CHIPS investment spending in the four states, including private investments as well as public support.

As a further set of evidence for estimating the overall investment spending shares for each of our four states—including private as well as public spending—we can incorporate the SIA's reported figures on overall "project size." These SIA figures on "project size" are estimates of the level of private investments on individual semiconductor fabrication projects that will accompany the public funding for these projects allocated through CHIPS.

To estimate overall CHIPS spending shares for Colorado, Michigan, Ohio, and Oregon, our procedure was to calculate the weighted average of public allocations shares by states along with two separate estimates of the private "project size" spending figures. In fact, our estimates of the relative shares of overall spending by state derived from these three separate calculation methods were very close to one another. Methodology Table 1 reports the results of calculating the weighted average of the three approaches. Further details on our calculation method are available from the authors.

It is notable that, with the CHIPS program, unlike the spending share figures by state for the IRA and BIL programs, there are wide disparities in the shares of overall spending

1 Semiconductor Industry Association, "CHIPS Incentive Announcements", accessed 5/30/2024 from https://www.semiconductors.org/chips-incentives-awards/

received by the four states. Thus, as the table above reports, we estimate that Oregon will receive fully 10.5 percent of all CHIPS spending throughout the U.S. economy—including both private spending and public grants—and Ohio will receive 8.0 percent of total spending. By contrast, we estimate that Colorado will receive a negligible 0.25 percent of overall CHIPS spending, and that Michigan will not receive any support, public or private, through the CHIPS program. These ratios are incorporated into our full set of estimates on employment impacts of BIL, IRA, and CHIPS for Colorado, Michigan, Ohio, and Oregon.

Estimating State-level Employment Estimates and Import Content Shares of Overall BIL, IRA, and CHIPS Spending Levels

The state-level IMPLAN model that we use for generating employment estimates offers two options for estimating the relative shares of state-level specific content of any activity within any given U.S. state within the overall U.S. economy. This includes expenditures on the BIL, IRA, and CHIPS programs. One option within IMPLAN is to assume that the relative shares of state-level content resulting from these activities will be equal to the existing shares of state-level content for each activity. The second option provided within IMPLAN is to assume that all expenditures will take place within the given state—i.e. that state-level content will rise to 100 percent across-the-board and that import content will be zero.

The employment estimates that we report here are based on taking the midpoint estimates between existing state content shares and a 100 percent domestic content scenario. Because the BIL, IRA and CHIPS programs are explicitly designed to promote activity within various regions in the U.S. as well as within the domestic U.S. economy overall, it is reasonable to assume that state-level content for these programs will be higher than existing state content levels. At the same time, it is unrealistic to assume that the state content will rise across-the-board to 100 percent, especially within the initial years in which these programs are operating.

Sources for BIL Estimates

- Text of the Bipartisan Infrastructure Law (BIL)/Infrastructure Investment and Jobs Act (IIJA): https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf
- White House Guidebook to the Bipartisan Infrastructure Law: https://www.whitehouse.gov/build/guidebook/
- Spreadsheet tabulation of the individual BIL programs modeled in this analysis: https://docs.google.com/spreadsheets/d/1IWPP6U9CAafNrkqnF2Y3-dZ2aw33LGCG/edit#gid=449713478

Sources for IRA Estimates

- Text of the Inflation Reduction Act of 2022: https://www.democrats.senate.gov/imo/media/doc/inflation_reduction_act_of_2022.pdf

- Line-item summary of the IRA programs modeled in this analysis: https://docs.google.com/document/d/1PpmSTgaA7gQ_hX2Sjpfi04tsrD1l8p5MRtFrfYb7pzQ/edit
- Spreadsheet tabulation of the IRA programs modeled in this analysis: https://docs.google.com/spreadsheets/d/1iHbr4Ph3cD7r30Z093pWUMV2P1kLhywAeW2UilVp09U/edit#gid=0
- Tax credit scores from the Congressional Budget Office and the Joint Committee on Taxation: https://www.cbo.gov/system/files/2022-08/hr5376_IR_Act_8-3-22.pdf

Sources for CHIPS Estimates

- Text of the CHIPS and Science Act: https://www.congress.gov/117/plaws/publ167/PLAW-117publ167.pdf
- CHIPS Program Fact Sheet: https://www.nist.gov/system/files/documents/2023/02/28/CHIPS_NOFO-1_Fact_Sheet_0.pdf
- Spreadsheet tabulation of the CHIPS programs modeled in this analysis: https://docs.google.com/spreadsheets/d/1IWPP6U9CAafNrkqnF2Y3-dZ2aw33LGCG/edit#gid=449713478

Data Sources

All figures have been estimated on the basis of calculations generated within the 2023 IMPLAN U.S. input/output tables. The IMPLAN U.S. input/output model features 546 industries within the U.S. economy. The data in the model are from 2021.

Time Dimension in Measuring Job Creation

Any type of spending activity creates employment over a given amount of time. To understand the impact on jobs of a given spending activity, one must therefore incorporate a time dimension into the measurement of employment creation. For example, a project that creates 100 jobs that last for one year only needs to be distinguished from another project that creates 100 jobs that continue for 10 years each. It is important to keep this time dimension in mind in any assessment of the impact of on job creation of any investment activity.

There are two straightforward ways in which one can express such distinctions. One is through measuring "job years." This measures cumulative job creation over the total number of years that jobs have been created. Thus, an activity that generates 100 jobs for 1 year would create 100 job years. By contrast, the activity that produces 100 jobs for 10 years would generate 1,000 job years. The other way to report the same figures would be in terms of jobs-per-year. Through this measure, we show the year-to-year breakdown of the overall level of job creation. Thus, with the 10-year project we are using in our example, we could express its effects as creating 100 jobs per year for 10 years.

In the following tables, we report employment creation both in terms of jobs-per-year—i.e. annual job creation—as well as cumulative job years.

Details on Employment Estimates

For in-depth discussions of our methodological approach to estimating job creation through investments in clean energy and infrastructure, see:

- Pollin et al. (2009) *How Infrastructure Investments Support the U.S. Economy,* http://s3-us-west-2.amazonaws.com/aamweb/uploads/research-pdf/Infrastructure_2009.pdf;
- Pollin et al. (2014) *Green Growth,* https://www.americanprogress.org/issues/green/reports/2014/09/18/96404/green-growth/;
- Pollin et al. (2015) *Global Green Growth,* https://www.unido.org/sites/default/files/2015-05/GLOBAL_GREEN_GROWTH_REPORT_vol1_final_0.pdf.

ESTIMATING JOB CHARACTERISTICS AND REPRESENTATIVE JOBS IN VARIOUS INVESTMENT AREAS

Our strategy for identifying the types of jobs that would be generated through the various investment activities presented here involves two steps.

The first step is to calculate, for each specific investment program, the level of employment generated in each of 546 industries through our input-output model (IMPLAN) as explained above.

Next, we apply this information on the industry composition of the new employment created by an investment with data on workers currently employed in the same industrial mix of jobs. We use the characteristics of these workers to create a profile of the types of jobs and the types of workers that will likely hold the jobs created with each investment. These characteristics include types of occupations, gender, race/ethnicity, union status, credential requirements, wages and job-related benefits.

For details on the estimating methodology, see Pollin et al (2021), *Impact of the Reimagine Appalachia & Clean Energy Transition Program for Pennsylvania,* Appendix 2.[2] Most of the job characteristic estimates in this analysis are based on the most up-to-date micro-data files available from the U.S. Labor Department as of the writing of this report, i.e. the 2021–2023 data files from the Labor Department's household survey, the Current Population Survey (CPS). Major exceptions include our estimates of job-related health insurance and retirement benefits. For these figures, we use data from the March supplemental survey of the CPS, the Annual Social and Economic survey (ASEC). Specifically, we pool ASEC data

2 https://peri.umass.edu/?view=article&id=1383:impacts-of-the-reimagine-appalachia-clean-energy-transition-programs-for-pennsylvania&catid=143

from the survey years of 2016–2019, and 2022–2023. We omit data collected during March 2020 and March 2021 to exclude data affected by the survey administration problems and employment shocks specific to the COVID-19 pandemic.

In addition, for some estimates, we include observations from nearby states or across Census regions to create sample sizes sufficient to analyze job characteristics for each law. Which geographic unit we used varies based on which type of CPS data file we used, as well as which law is being analyzed. This is because the CPS samples vary in size by data file. Additionally, each law draws observations from a different set of industries, each of which varies in the number of available observations.

Specifically, the demographic characteristics of the workforce are based on the full set of basic monthly files of the CPS. The average wage and union membership estimates are based on a subset of the basic monthly files referred to as the "outgoing rotation group" (ORG) data files of the CPS. These ORG data files have smaller sample sizes than the basic monthly files. The job benefits estimates—health insurance and retirement benefits—are based on the ASEC files of the CPS as noted above. These data files have smaller sample sizes than both the basic monthly files and the ORG data files.

We provide for reference the job quality and demographic characteristics for each state's total workforce across all industries. For these estimates, we use data from within the state only. Note that the sample used to estimate each state's total workforce characteristics may be somewhat different from those used to estimate job characteristics for the employment created by each law. This is, again, because we may pool across geographic units to get sufficient sample sizes for the industries for which each law generates employment. For example, the characteristics that appear in column 1 of Summary Table 3 will be based on data from within each state only. However, depending on the law, the characteristics that appear in columns 2 through 5 may be based on samples from the state only, or pooled across nearby states. We produce the job characteristics estimates for each law in this way in order to use the most industry-specific data available.

Additional Points of Clarification on Job Quality, Demographics, and Prevalent Job Types

1. Current vs. future workforce composition. The figures we report on, for example, wage levels and percentages of women and people of color employed in the various activities reflect the current composition of the workforce. Wage rates could rise over time through effective union organizing campaigns. Similarly, the share of women and people of color in the workforce could also rise through organizing and the establishment of effective affirmative action policies. See Pollin et al. (2020) for further discussion on these issues.[3]

3 https://peri.umass.edu/?view=article&id=1355:employment-creation-and-just-transition-through-a-u-s-zero-carbon-program&catid=143

2. All jobs within given industries vs. specific occupational categories. The figures we report on jobs by industry, such as the services, manufacturing, or construction industry, are distinct from the figures we cite on specific prevalent occupations. For example, the share of construction jobs, as an occupation, that are generated by BIL-related broadband investments is a distinct category from the overall job creation in the construction sector. Jobs generated in the construction sector will include secretaries, accountants, and truck drivers as well as those who perform construction work as their occupation.

ESTIMATES ON LEVERAGING PUBLIC FUNDS TO EXPAND OVERALL PUBLIC AND PRIVATE SPENDING

BIL and CHIPS Loan and Loan Guarantee Programs

These are the specific measures in the BIL and CHIPS programs that include loan or loan guarantee financing.

BIL

- *Broadband*:
  - Distance Learning, Telemedicine, and Broadband Program: Broadband Loans (corporations eligible for direct loans)
  - Distance Learning, Telemedicine, and Broadband Program: Reconnect Program (corporations eligible for combinations of direct loans and grants)
- *Energy:*
  - Transmission Facilitation Program (developers may access funding through loans, direct financing, and capacity purchases)

CHIPS

- *Manufacturing*:
  - Manufacturing Incentives
  - Advanced Manufacturing Tax Credit

To estimate total spending levels for these programs relative to their public funding allocation, we work from the relevant description in the CHIPS Program Fact Sheet. The Fact Sheet includes the following explanation on leveraging for the relevant CHIPS programs:

> There is also no fixed limit on the loans or loan guarantees that a project may receive. Applicants can request loans or loan guarantees to provide debt financing that is not available on comparable terms on the private market, and the specific terms will be based on a project's financing requirements and risk profile. A single application can result in an award that contains more than one type of incentive. The CHIPS Program Office generally expects that the total amount of an award, inclusive of direct funding and the principal amount of a loan or loan guarantee, will not exceed 35% of project capital expenditures.

Based on this expectation within the CHIPS Program Office, we assume that with both the BIL and CHIPS programs listed above that the public funding that is allocated for these pro-

grams will constitute 35 percent of total public and private funding. That is, for all of these programs, we multiply the public funding allocation by 2.85 to estimate the total funding level.

IRA Tax Credit, Loan, and Loan Guarantee Programs

Tax credit and related incentive programs. For all tax credit and related programs in which public spending is designed to incentivize further private spending, we assume that the overall level of public spending will be matched equally by the same level of private spending—i.e. $2 in total spending for every dollar of public funding. For example, we assume that the proposed $7,500 tax credit per electric vehicle would incentivize another $7,500 in private spending for electric vehicle purchases, for a total of $15,000 in overall spending. The literature on leveraging public sector funds for incentivizing private spending considers a large number of variables and presents a range of estimates as to the likely private spending levels that result from such leveraging programs. We deliberately assume here a relatively low leveraging rate for the relevant IRA programs.[4]

Loan guarantee programs. The Department of Energy's loan guarantee programs stipulate the loan authority associated with each level of appropriation. This includes a $250 billion loan authority associated with a $5 billion appropriation for the larger DOE program and a $40 billion authority based on a $3.6 billion appropriation. For the Tribal Loan Guarantee program, we assume the authority is $3.8 billion based on an appropriation of $75 million. The program thus assumes an approximate 50-to-1 leveraging ratio.[5]

TIME HORIZONS FOR BIL, IRA, AND CHIPS PROGRAMS

The time periods during which the various programs of these measures operate vary—both within each measure and between them. For the purposes of our estimates, we work with the simple summary assumption that the BIL and CHIPS programs will operate, on average, for 5 years, and the IRA programs will operate for 10 years. Our assumptions are based on the following:

BIL: There are a total nearly 300 individual programs under BIL. According to the White House's BIL Guidebook, roughly 30 programs within BIL are mandated to operate for 5 years. Another roughly 50 programs are mandated for 4 years. Roughly 20 programs have fewer than 4 year time frames, and less than 20 are designated for 10 years or longer. The remaining more than 200 programs are designed to continue until 'available funds are

4 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf; https://www.cgdev.org/sites/default/files/assessing-leverage-climate-investment-funds.pdf

5 Discussion of the larger DOE program is at https://prospect.org/environment/inflation-reduction-bill-uses-public-finance-to-stoke-energy-investment/. We note that this 50-to-1 leveraging ratio for the DOE loan guarantees is close to the 47-to-1 ratio resulting from the DOE's 1705 loan guarantee program within the 2009 American Recovery and Reinvestment Act. See Pollin et al. (2014), pp. 260 – 263 for discussion on the this earlier loan guarantee program.

expended.' For our purposes, assuming an average 5-year time span for all BIL programs is a reasonable rough and workable approximation.

IRA: According to the IRS, the stipulations of the IRA are meant to remain in place for 10 years: https://www.irs.gov/inflation-reduction-act-of-2022#:~:text=Since%20the%20Inflation%20Reduction%20Act,as%20quickly%20as%20we%20can.

CHIPS: According to the CBO, the budget authority for more than 90 percent of spending under CHIPS extends for 5 years: https://www.cbo.gov/system/files?file=2022-07/hr4346_chip.pdf. As a working approximation, we therefore assume that the full set of programs under CHIPS will operate for 5 years.

SUMMARY TABLES FOR OHIO:
Job Creation, Job Quality, and Workforce Demographics Estimates for BIL, IRA, and CHIPS

SUMMARY TABLE 1.

Average Annual Budgets and Job Creation in Ohio through BIL, IRA, and CHIPS

	Average Annual Budgets *Public + Estimated Private Spending*	Average Annual Job Creation	Total Job Years
BIL	$5,256 million	39,385	196,925
IRA	$3,346 million	18,304	183,040
CHIPS	$2,798 million	15,011	75,054
TOTALS	**$11,400 million** As share of state GDP 2022: 1.4%	**72,700** As share of state labor force 2022: 1.3%	**455,019**

SUMMARY TABLE 2.

Average Annual Job Creation in 6 Major Sectors in Ohio through BIL, IRA, and CHIPS

	BIL	IRA	CHIPS	TOTALS
Total Job Creation	**39,385**	**18,304**	**15,011**	**72,700**
Services	17,412	7,271	8,206	32,889
Construction	9,323	4,690	2,336	16,349
Manufacturing	2,756	3,335	2,320	8,411
Transport/Warehousing	4,657	772	647	6,076
Wholesale/Retail	4,145	1,615	1,405	7,165
Utilities	233	68	36	337
Combined	38,526	17,751	14,950	71,227
Combined as share of total job creation	97.8%	97.0%	99.6%	98.0%

Notes: Figures in table are rounded. Remaining job creation is divided among agriculture/forestry/hunting; mining and mining-related activities.

SUMMARY TABLE 3.

Job Quality Indicators of Employment Created in Ohio through BIL, IRA, and CHIPS: Direct Jobs Only

	1. Total Ohio Workforce	2. BIL, IRA, and CHIPS Combined *(34,670 average annual direct jobs)*	3. BIL *(19,090 average annual direct jobs)*	4. IRA *(9,370 average annual direct jobs)*	5. CHIPS *(6,210 average annual direct jobs)*
Average (median) hourly wage	$22.50	$26.05	$26.05	$25.30	$27.05
Health Insurance coverage, percentage	51.8%	49.2%	46.9%	51.8%	52.5%
Retirement plans, percentage	47.9%	38.8%	34.9%	39.4%	50.0%
Union membership	13.4%	13.0%	14.8%	12.6%	8.1%

Notes: Wages are in 2023 dollars. Health insurance coverage indicates the share of jobs with employer-sponsored health insurance. Retirement plans indicate the share of jobs with employers that offer retirement plans. To get sufficient sample sizes, samples across time and a select number of states have been pooled. See main text for details.

SUMMARY TABLE 4.

Educational Credentials and Race/Gender Composition of Workers in Ohio in BIL, IRA, CHIPS-Related Employment: Direct Jobs Only

	1. Total Ohio Workforce	2. BIL, IRA, and CHIPS Combined *(34,670 average annual direct jobs)*	3. BIL *(19,090 average annual direct jobs)*	4. IRA *(9,370 average annual direct jobs)*	5. CHIPS *(6,210 average annual direct jobs)*
Educational credentials					
Share with less than high school degree	6.7%	8.5%	9.2%	8.6%	5.9%
Share with high school degree only	29.9%	35.5%	36.3%	39.0%	27.6%
Share with some college, no degree	16.8%	16.2%	17.1%	15.0%	14.9%
Share with Associate's degree *(occupational/ vocational or academic)*	10.8%	10.5%	11.3%	9.4%	9.7%
Share with Bachelor's degree or higher	35.8%	29.4%	26.0%	27.9%	42.0%
Racial and gender composition of workforce					
Pct. White, non-Latinx	78.8%	81.5%	78.0%	85.7%	85.7%
Pct. BIPOC (incl. Latinx)	21.2%	18.5%	22.0%	14.3%	14.3%
Pct. Black, non-Latinx	13.1%	9.1%	11.8%	5.8%	5.9%
Pct. Asian, non-Latinx	3.0%	1.7%	1.7%	1.1%	2.3%
Pct. American Indian/Aleut/ Eskimo, non-Latinx	0.1%	0.1%	0.1%	0.0%	0.1%
Pct. Other*, non-Latinx	0.8%	0.9%	1.0%	0.6%	1.1%
Pct. Latinx**	4.5%	7.0%	7.5%	7.1%	5.0%
Pct. Men***	52.6%	78.7%	79.8%	79.7%	73.8%
Pct. Women***	47.4%	21.3%	20.2%	20.3%	26.2%

Notes: *"Other" includes the following groups: Hawaiian/Pacific Islanders and multi-racial.
** The CPS survey, on which these data are based, asks respondents to identify whether they are "Spanish, Hispanic, or Latino." We use Latinx here because of the growing usage of this ethnic category to identify people with Latin American, as opposed to, Spanish heritage. We use Latinx to be more inclusive across gender categories.
***Labor Department data include only binary gender categories.
To get sufficient sample sizes, samples across time and a select number of states have been pooled. See main text for details.

EMPLOYMENT IMPACTS IN OHIO OF BIL:
Bipartisan Infrastructure Law

Job Creation in Ohio Through Investment Categories:
Across All Industries

BIL-1. OHIO ESTIMATES
Jobs Created Across *All Industries* by BIL Major Investment Category with Budgetary Figures

BIL Investment Category	All Sectors Jobs/ $1 Million				Annual Budget	Annual Job Creation				Job Years Created over 5 Years	
	Direct Jobs	Indirect Jobs	Induced Jobs	Total Jobs		Direct Jobs	Indirect Jobs	Induced Jobs	Total Jobs	Total Budget	Total Job Years
1. Roads, Bridges, Ports and Waterways, and Transportation Safety	3.8	2.1	2.1	8.1	$2,351.3 million	9,026	4,920	5,005	18,951	$11,756.7 million	94,755
2. Public Transit and Freight Rail	3.9	1.5	1.9	7.4	$926.7 million	3,653	1,433	1,769	6,855	$4,633.4 million	34,275
3. Energy Production, Safety, and Environmental Remediation	3.5	1.6	2.2	7.4	$428.8 million	1,515	706	960	3,181	$2,143.9 million	15,905
4. Broadband	2.4	1.6	1.5	5.6	$422.3 million	1,033	683	649	2,365	$2,111.4 million	11,825
5. Water	2.9	1.7	1.9	6.4	$400.9 million	1,160	670	753	2,583	$2,004.5 million	12,915
6. Lands and Resilience	5.4	1.8	2.5	9.7	$232.3 million	1,258	419	574	2,251	$1,161.5 million	11,255
7. Alternative Energy and Storage	2.5	1.5	1.8	5.7	$177.9 million	440	266	316	1,022	$889.7 million	5,110
8. Airports	3.8	2.1	2.3	8.2	$155.0 million	594	324	354	1,272	$775.0 million	6,360
9. Electric Vehicles, Buses, and Ferries	1.8	1.1	1.3	4.2	$115.5 million	211	125	145	481	$577.7 million	2,405
10. Buildings	4.1	2.8	2.4	9.3	$36.1 million	148	102	85	335	$180.6 million	1,675
11. Economic Development	4.9	1.9	2.5	9.3	$9.5 million	47	18	24	89	$47.5 million	445
Totals	--	--	--	--	$5,256.4 million	19,085	9,666	10,634	39,385	$26,281.8 million	196,925

Note: Due to rounding, direct, indirect, and induced job multipliers, within row, may not sum to "Total" job multiplier.

Indicators of Job Quality and Workforce Demographics in Ohio Within Investment Categories

BIL-2. OHIO ESTIMATES

Indicators of Job Quality in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

		BIL Investment Categories					
	1. Total Ohio Workforce	2. Total BIL Workforce	3. Roads, Bridges, Ports and Waterways, and Transportation Safety	4. Public Transit and Freight Rail	5. Energy Production, Safety, and Environmental Remediation	6. Broadband	7. Water
Average (median) hourly wage	$22.50	$26.05	$26.05	$22.90	$32.00	$27.05	$29.25
Health insurance coverage, percentage	51.8%	46.9%	43.9%	46.7%	54.8%	52.0%	55.3%
Retirement plans, percentage	47.9%	34.9%	33.4%	33.4%	39.0%	39.7%	44.8%
Union membership	13.4%	14.8%	17.0%	16.2%	5.8%	17.5%	12.4%

	BIL Investment Categories					
	8. Lands and Resilience	9. Alternative Energy and Storage	10. Airports	11. Electric Vehicles, Buses, and Ferries	12. Buildings	13. Economic Development
Average (median) hourly wage	$28.10	$27.05	$26.40	$27.05	$26.05	$26.05
Health insurance coverage, percentage	44.1%	56.8%	44.1%	61.7%	41.1%	42.6%
Retirement plans, percentage	28.3%	45.1%	33.4%	47.8%	30.6%	30.8%
Union membership	6.9%	8.4%	19.7%	14.1%	19.5%	10.0%

Notes: Wages are in 2023 dollars. Health insurance coverage indicates the share of jobs with employer-sponsored health insurance. Retirement plans indicate the share of jobs with employers that offer retirement plans. To get sufficient sample sizes, samples across time and a select number of states have been pooled. See main text for details.

BIL-3. OHIO ESTIMATES

Educational Credentials and Race/Gender Composition of Workers in BIL-Related Employment by Major Investment Category: Direct Jobs Only

	1. Total Ohio Workforce	BIL Investment Categories					
		2. Total BIL Workforce	3. Roads, Bridges, Ports and Waterways, and Transportation Safety	4. Public Transit and Freight Rail	5. Energy Production, Safety, and Environmental Remediation	6. Broadband	7. Water
Educational credentials							
Share with less than high school degree	6.7%	9.2%	10.6%	9.7%	4.1%	10.6%	4.1%
Share with high school degree only	29.9%	36.3%	39.8%	37.4%	20.4%	42.2%	27.3%
Share with some college, no degree	16.8%	17.1%	19.2%	19.3%	10.9%	16.9%	12.8%
Share with Associate's degree (occupational/ vocational or academic)	10.8%	11.3%	11.1%	14.7%	7.8%	10.2%	10.2%
Share with Bachelor's degree or higher	35.8%	26.0%	19.3%	18.9%	56.9%	20.1%	45.5%
Racial and gender composition of workforce							
Pct. White, non-Latinx	78.8%	78.0%	77.2%	71.8%	81.8%	81.3%	83.6%
Pct. BIPOC (incl. Latinx)	21.2%	22.0%	22.8%	28.2%	18.2%	18.7%	16.4%
Pct. Black, non-Latinx	13.1%	11.8%	11.7%	19.9%	8.2%	7.1%	8.2%
Pct. Asian, non-Latinx	3.0%	1.7%	1.1%	1.6%	4.7%	0.5%	2.7%
Pct. American Indian/Aleut/ Eskimo, non-Latinx	0.1%	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%
Pct. Other*, non-Latinx	0.8%	1.0%	1.1%	1.3%	0.7%	0.7%	0.8%
Pct. Latinx**	4.5%	7.5%	9.0%	5.5%	4.5%	10.4%	4.6%
Pct. Men***	52.6%	79.8%	83.0%	80.0%	68.8%	87.1%	74.7%
Pct. Women***	47.4%	20.2%	17.0%	20.0%	31.2%	12.9%	25.3%

Continued

BIL-3. OHIO ESTIMATES *(cont.)*

Educational Credentials and Race/Gender Composition of Workers in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

	BIL Investment Categories					
	8. Lands and Resilience	9. Alternative Energy and Storage	10. Airports	11. Electric Vehicles, Buses, and Ferries	12. Buildings	13. Economic Development
Educational credentials						
Share with less than high school degree	6.9%	6.5%	12.8%	7.7%	14.0%	7.6%
Share with high school degree only	28.7%	28.6%	42.8%	37.7%	45.4%	25.7%
Share with some college, no degree	10.3%	12.5%	16.1%	15.9%	16.3%	15.4%
Share with Associate's degree (occupational/ vocational or academic)	10.6%	8.6%	10.7%	10.9%	10.1%	12.9%
Share with Bachelor's degree or higher	43.5%	43.9%	17.6%	27.8%	14.2%	38.4%
Racial and gender composition of workforce						
Pct. White, non-Latinx	84.3%	84.1%	81.6%	82.6%	81.5%	81.8%
Pct. BIPOC (incl. Latinx)	15.7%	15.9%	18.4%	17.4%	18.5%	18.2%
Pct. Black, non-Latinx	7.1%	5.3%	5.4%	5.9%	5.3%	7.9%
Pct. Asian, non-Latinx	3.0%	3.7%	1.1%	2.0%	0.5%	3.9%
Pct. American Indian/Aleut/ Eskimo, non-Latinx	0.1%	0.1%	0.1%	0.1%	0.1%	0.3%
Pct. Other*, non-Latinx	0.6%	0.2%	0.9%	0.7%	0.8%	0.5%
Pct. Latinx**	5.1%	6.5%	11.0%	8.8%	11.9%	5.6%
Pct. Men***	67.0%	68.4%	88.5%	78.1%	89.7%	71.3%
Pct. Women***	33.0%	31.6%	11.5%	21.9%	10.3%	28.7%

Notes: *"Other" includes the following groups: Hawaiian/Pacific Islanders and multi-racial.
** The CPS survey, on which these data are based, asks respondents to identify whether they are "Spanish, Hispanic, or Latino." We use Latinx here because of the growing usage of this ethnic category to identify people with Latin American, as opposed to, Spanish heritage. We use Latinx to be more inclusive across gender categories.
***Labor Department data include only binary gender categories.
To get sufficient sample sizes, samples across time and a select number of states have been pooled. See main text for details.

Prevalent Job Types in Ohio Within Investment Categories

BIL-4. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only
Job categories with 5 percent or more employment

Job Creation Through**: Roads, Bridges, Ports and Waterways, and Transportation Safety**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Construction	3,356	37.2%	Electricians; painters and paperhangers; first-line supervisors of construction trades and extraction workers
Management	1,802	20.0%	General and operations managers; financial managers; chief executives
Transportation and Material Moving	1,340	14.9%	Shuttle drivers and chauffeurs; driver/sales workers and truck drivers; transit and intercity bus drivers
Installation, Maintenance, and Repair	523	5.8%	Automotive service technicians and mechanics; telecommunications line installers and repairers; heavy vehicle and mobile equipment service technicians and mechanics
Office and Administrative Support	510	5.6%	General office clerks; first-line supervisors of office and administrative support workers; bookkeeping, accounting, and auditing clerks

Note: Figures in table are rounded.

BIL-5. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Public Transit and Freight Rail**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Transportation and Material Moving	1,177	32.2%	Driver/sales workers and truck drivers; shuttle drivers and chauffeurs; transit and intercity bus drivers
Construction	590	16.1%	Electricians; carpenters; construction laborers
Management	486	13.3%	Financial managers; general and operations managers; construction managers
Production	367	10.0%	First-line supervisors of production and operating workers; welding, soldering, and brazing workers; inspectors, testers, sorters, samplers, and weighers
Architecture and Engineering, and Technicians	213	5.8%	Mechanical engineers; electrical and electronics engineers; civil engineers
Farming, Fisheries, and Forestry	203	5.6%	Agricultural products graders and sorters; first-line supervisors of farming, fishing, and forestry workers; logging workers

Note: Figures in table are rounded.

BIL-6. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only
Job categories with 5 percent or more employment

Job Creation Through**: Energy Production, Safety, and Environmental Remediation**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Business Operations Specialists	263	17.4%	Market research analysts and marketing specialists; human resources workers; project management specialists
Management	232	15.3%	General and operations managers; sales managers; marketing managers
Architecture and Engineering, and Technicians	192	12.7%	Mechanical engineers; architects; electrical and electronics engineers
Transportation and Material Moving	175	11.6%	Hand packers and packagers; refuse and recyclable material collectors; hand laborers and freight, stock, and material movers
Office and Administrative Support	133	8.8%	Secretaries and administrative assistants; bookkeeping, accounting, and auditing clerks; shipping, receiving, and inventory clerks
Computer and Mathematical	99	6.5%	Computer programmers; computer systems analysts; computer support specialists

Note: Figures in table are rounded.

BIL-7. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only
Job categories with 5 percent or more employment

Job Creation Through**: Broadband**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Construction	401	38.8%	Painters and paperhangers; electricians; first-line supervisors of construction trades and extraction workers
Management	205	19.9%	Sales managers; chief executives; construction managers
Installation, Maintenance, and Repair	114	11.1%	Heavy vehicle and mobile equipment service technicians and mechanics; general maintenance and repair workers; radio and telecommunications equipment installers and repairers
Office and Administrative Support	70	6.8%	General office clerks; first-line supervisors of office and administrative support workers; secretaries and administrative assistants

Note: Figures in table are rounded.

BIL-8. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Water**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Management	201	17.3%	Financial managers; chief executives; general and operations managers
Construction	154	13.3%	First-line supervisors of construction trades and extraction workers; electricians; carpenters
Architecture and Engineering, and Technicians	151	13.0%	Mechanical engineers; electrical and electronics engineers; civil engineers
Production	132	11.4%	Inspectors, testers, sorters, samplers, and weighers; first-line supervisors of production and operating workers; water and wastewater treatment plant and system operators
Business Operations Specialists	110	9.5%	Training and development specialists; market research analysts and marketing specialists; project management specialists
Office and Administrative Support	91	7.9%	Shipping, receiving, and inventory clerks; bookkeeping, accounting, and auditing clerks; secretaries and administrative assistants

Note: Figures in table are rounded.

BIL-9. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Lands and Resilience**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Management	228	18.1%	Chief executives; farmers, ranchers, and other agricultural managers; construction managers
Construction	180	14.3%	First-line supervisors of construction trades and extraction workers; carpenters; construction laborers
Business Operations Specialists	171	13.6%	Human resources workers; training and development specialists; management analysts
Office and Administrative Support	93	7.4%	Shipping, receiving, and inventory clerks; customer service representatives; first-line supervisors of office and administrative support workers
Building and Grounds Cleaning and Maintenance	68	5.4%	Tree trimmers and pruners; first-line supervisors of landscaping, lawn service, and groundskeeping workers; landscaping and groundskeeping workers
Architecture and Engineering, and Technicians	65	5.2%	Industrial engineers; electrical and electronics engineers; civil engineers

Note: Figures in table are rounded.

BIL-10. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through: **Alternative Energy and Storage**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Management	78	17.7%	Chief executives; sales managers; construction managers
Production	63	14.4%	Inspectors, testers, sorters, samplers, and weighers; first-line supervisors of production and operating workers; metal workers and plastic workers
Construction	62	14.0%	Plumbers, pipefitters, and steamfitters; carpenters; construction laborers
Life, Physical, and Social Science	44	10.0%	Agricultural and food scientists; geoscientists and hydrologists; life, physical, and social science technicians
Office and Administrative Support	39	8.9%	Bookkeeping, accounting, and auditing clerks; customer service representatives; secretaries and administrative assistants
Computer and Mathematical	25	5.6%	Network and computer systems administrators; computer support specialists; software developers
Architecture and Engineering, and Technicians	23	5.1%	Mechanical engineers; engineering technologists and technicians; electrical and electronics engineers

Note: Figures in table are rounded.

BIL-11. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through: **Airports**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Construction	296	49.8%	Electricians; painters and paperhangers; first-line supervisors of construction trades and extraction workers
Management	133	22.4%	General and operations managers; financial managers; chief executives
Installation, Maintenance, and Repair	40	6.8%	Industrial and refractory machinery mechanics; telecommunications line installers and repairers; aircraft mechanics and service technicians
Office and Administrative Support	31	5.2%	Payroll and timekeeping clerks; first-line supervisors of office and administrative support workers; customer service representatives

Note: Figures in table are rounded.

BIL-12. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Electric Vehicles, Buses, and Ferries**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Production	56	26.8%	Inspectors, testers, sorters, samplers, and weighers; first-line supervisors of production and operating workers; metal workers and plastic workers
Management	36	16.9%	Industrial production managers; chief executives; sales managers
Construction	35	16.5%	Plumbers, pipefitters, and steamfitters; first-line supervisors of construction trades and extraction workers; construction laborers
Architecture and Engineering, and Technicians	18	8.6%	Industrial engineers; mechanical engineers; electrical and electronics engineers
Office and Administrative Support	15	7.0%	Production, planning, and expediting clerks; shipping, receiving, and inventory clerks; customer service representatives
Installation, Maintenance, and Repair	11	5.3%	Automotive service technicians and mechanics; heating, air conditioning, and refrigeration mechanics and installers; general maintenance and repair workers
Transportation and Material Moving	11	5.2%	Stockers and order fillers; industrial truck and tractor operators; driver/sales workers and truck drivers

Note: Figures in table are rounded.

BIL-13. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Buildings**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Construction	82	55.3%	Electricians; painters and paperhangers; carpenters
Management	34	22.9%	General and operations managers; financial managers; construction managers
Installation, Maintenance, and Repair	10	6.6%	General maintenance and repair workers; telecommunications line installers and repairers; heating, air conditioning, and refrigeration mechanics and installers

Note: Figures in table are rounded.

BIL-14. OHIO ESTIMATES

Prevalent Job Types in *BIL-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Economic Development**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Construction	8	18.1%	Painters and paperhangers; electricians; first-line supervisors of construction trades and extraction workers
Management	7	15.7%	Marketing managers; chief executives; education and childcare administrators
Installation, Maintenance, and Repair	7	15.4%	Precision instrument and equipment repairers; radio and telecommunications equipment installers and repairers; computer, automated teller, and office machine repairers
Education, Training, and Library	5	10.2%	Secondary school teachers; postsecondary teachers; teaching assistants
Architecture and Engineering, and Technicians	4	7.6%	Architects; electrical and electronics engineers; civil engineers
Business Operations Specialists	3	6.8%	Cost estimators; human resources workers; project management specialists
Office and Administrative Support	3	6.0%	Customer service representatives; bookkeeping, accounting, and auditing clerks; secretaries and administrative assistants

Note: Figures in table are rounded.

EMPLOYMENT IMPACTS IN OHIO OF IRA:
Inflation Reduction Act

Job Creation in Ohio Through Investment Categories:
Across All Industries

IRA-1. OHIO ESTIMATES
Jobs Created Across *All Industries* by IRA Major Investment Category with Budgetary Figures

IRA Investment Category	All Sectors Jobs/ $1 Million				Annual Budget	Annual Job Creation				Job Years Created over 10 Years	
	Direct Jobs	Indirect Jobs	Induced Jobs	Total Jobs		Direct Jobs	Indirect Jobs	Induced Jobs	Total Jobs	Total Budget	Total Job Years
1. Electricity	2.8	1.1	1.6	5.5	$2,254.6 million	6,325	2,488	3,564	12,377	$22,546.0 million	123,770
2. Manufacturing	2.2	1.1	1.5	4.8	$434.1 million	934	498	631	2,063	$4,341.3 million	20,630
3. Buildings	1.8	1.0	1.1	3.9	$318.9 million	567	315	363	1,245	$3,189.4 million	12,450
4. Transportation	3.3	1.3	1.4	6.0	$190.5 million	635	255	262	1,152	$1,904.5 million	11,520
5. Agriculture	6.7	1.7	2.0	10.4	$73.6 million	497	125	146	768	$736.1 million	7,680
6. Environmental Justice and Community Resilience	3.7	1.7	2.0	7.4	$37.5 million	141	63	75	279	$375.4 million	2,790
7. Lands	7.2	1.8	2.3	11.3	$37.1 million	269	65	86	420	$371.5 million	4,200
Totals	--	--	--	--	$3,346.4 million	9,368	3,809	5,127	18,304	$33,464.2 million	183,040

Note: Due to rounding, direct, indirect, and induced job multipliers, within row, may not sum to "Total" job multiplier. This table includes the jobs created across all industries.

Indicators of Job Quality and Workforce Demographics in Ohio Within Investment Category

IRA-2. OHIO ESTIMATES

Indicators of Job Quality in *IRA-Related Employment* by Major Investment Category: Direct Jobs Only

		IRA Investment Categories							
	1. Total Ohio. Workforce	2. Total IRA Workforce	3. Electricity	4. Manufacturing	5. Buildings	6. Transportation	7. Agriculture	8. Lands	9. Environmental Justice and Community Resilience
Average (median) hourly wage	$22.50	$25.30	$26.05	$26.05	$23.45	$23.45	$19.80	$18.00	$25.50
Health insurance coverage, percentage	51.8%	51.8%	52.9%	56.9%	66.0%	44.7%	34.6%	30.4%	47.0%
Retirement plans, percentage	47.9%	39.4%	40.0%	43.6%	50.6%	32.0%	27.4%	27.4%	34.0%
Union membership	13.4%	12.6%	13.8%	14.4%	5.4%	11.4%	8.5%	8.9%	6.7%

Notes: Wages are in 2023 dollars. Health insurance coverage indicates the share of jobs with employer-sponsored health insurance. Retirement plans indicate the share of jobs with employers that offer retirement plans. To get sufficient sample sizes, samples across time and a select number of states have been pooled. See main text for details.

IRA-3. OHIO ESTIMATES

Educational Credentials and Race/Gender Composition of Workers in *IRA-Related Employment* by Major Investment Category: Direct Jobs Only

		IRA Investment Categories							
	1. Total Ohio Workforce	2. Total IRA Workforce	3. Electricity	4. Manufacturing	5. Buildings	6. Transportation	7. Agriculture	8. Lands	9. Environmental Justice and Community Resilience
Educational credentials									
Share with less than high school degree	6.7%	8.6%	8.9%	8.0%	10.4%	8.8%	5.7%	7.0%	7.1%
Share with high school degree only	29.9%	39.0%	40.8%	41.9%	38.7%	37.0%	27.0%	21.5%	24.7%
Share with some college, no degree	16.8%	15.0%	14.8%	15.4%	15.0%	18.3%	14.7%	13.0%	12.3%
Share with Associate's degree *(occupational/vocational or academic)*	10.8%	9.4%	9.7%	9.7%	12.8%	9.2%	5.4%	4.5%	6.9%
Share with Bachelor's degree or higher	35.8%	27.9%	25.7%	24.9%	23.1%	26.7%	47.2%	54.0%	49.1%
Racial and gender compostion of workforce									
Pct. White, non-Latinx	78.8%	85.7%	86.6%	85.0%	85.0%	80.8%	88.5%	81.3%	74.2%
Pct. BIPOC (incl. Latinx)	21.2%	14.3%	13.4%	15.0%	15.0%	19.2%	11.5%	18.7%	25.8%
Pct. Black, non-Latinx	13.1%	5.8%	4.7%	6.4%	7.1%	12.8%	4.9%	6.9%	12.2%
Pct. Asian, non-Latinx	3.0%	1.1%	0.8%	1.1%	2.0%	1.1%	1.3%	1.6%	5.6%
Pct. American Indian/Aleut/ Eskimo, non-Latinx	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%
Pct. Other*, non-Latinx	0.8%	0.6%	0.7%	0.6%	0.2%	0.7%	0.0%	0.0%	0.2%
Pct. Latinx**	4.5%	7.1%	7.2%	7.0%	5.7%	6.5%	6.8%	9.8%	7.8%
Pct. Men***	52.6%	79.7%	83.3%	82.9%	78.0%	72.9%	56.5%	53.7%	67.4%
Pct. Women***	47.4%	20.3%	16.7%	17.1%	22.0%	27.1%	43.5%	46.3%	32.6%

Notes: *"Other" includes the following groups: Hawaiian/Pacific Islanders and multi-racial.
** The CPS survey, on which these data are based, asks respondents to identify whether they are "Spanish, Hispanic, or Latino." We use Latinx here because of the growing usage of this ethnic category to identify people with Latin American, as opposed to, Spanish heritage. We use Latinx to be more inclusive across gender categories.
***Labor Department data include only binary gender categories.
To get sufficient sample sizes, samples across time and a select number of states have been pooled. See main text for details.

Prevalent Job Types in Ohio Within Investment Categories

IRA-4. OHIO ESTIMATES

Prevalent Job Types in *IRA-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Electricity**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Construction	2,195	34.7%	First-line supervisors of construction trades and extraction workers; carpenters; construction laborers
Management	1,462	23.1%	Sales managers; purchasing managers; construction managers
Production	644	10.2%	Metal and plastic machine tool setters, operators, and tenders; welding, soldering, and brazing workers; metal workers and plastic workers
Installation, Maintenance, and Repair	382	6.0%	Telecommunications line installers and repairers; industrial and refractory machinery mechanics; heavy vehicle and mobile equipment service technicians and mechanics
Office and Administrative Support	367	5.8%	Production, planning, and expediting clerks; customer service representatives; bookkeeping, accounting, and auditing clerks
Architecture and Engineering, and Technicians	337	5.3%	Engineering technologists and technicians; industrial engineers; electrical and electronics engineers

Note: Figures in table are rounded.

IRA-5. OHIO ESTIMATES

Prevalent Job Types in *IRA-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Manufacturing**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Construction	271	29.0%	Painters and paperhangers; electricians; construction laborers
Management	191	20.5%	Chief executives; purchasing managers; construction managers
Production	150	16.1%	Inspectors, testers, sorters, samplers, and weighers; first-line supervisors of production and operating workers; metal workers and plastic workers
Installation, Maintenance, and Repair	56	6.0%	First-line supervisors of mechanics, installers, and repairers; industrial and refractory machinery mechanics; heavy vehicle and mobile equipment service technicians and mechanics
Office and Administrative Support	51	5.5%	Shipping, receiving, and inventory clerks; customer service representatives; bookkeeping, accounting, and auditing clerks; secretaries and administrative assistants
Architecture and Engineering, and Technicians	51	5.5%	Industrial engineers; mechanical engineers; electrical and electronics engineers
Transportation and Material Moving	47	5.0%	Crane and tower operators; industrial truck and tractor operators; hand laborers and freight, stock, and material movers

Note: Figures in table are rounded.

IRA-6. OHIO ESTIMATES

Prevalent Job Types in *IRA-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Buildings**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Production	249	43.9%	First-line supervisors of production and operating workers; welding, soldering, and brazing workers; inspectors, testers, sorters, samplers, and weighers
Management	77	13.6%	Purchasing managers; industrial production managers; general and operations managers
Transportation and Material Moving	54	9.6%	Machine feeders and offbearers; stockers and order fillers; industrial truck and tractor operators
Office and Administrative Support	44	7.8%	General office clerks; production, planning, and expediting clerks; executive secretaries and executive administrative assistants
Architecture and Engineering, and Technicians	36	6.4%	Civil engineers; electrical and electronics engineers; mechanical engineers
Installation, Maintenance, and Repair	29	5.0%	Heavy vehicle and mobile equipment service technicians and mechanics; computer, automated teller, and office machine repairers; general maintenance and repair workers

Note: Figures in table are rounded.

IRA-7. OHIO ESTIMATES

Prevalent Job Types in *IRA-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Transportation**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Management	198	31.2%	Chief executives; construction managers; farmers, ranchers, and other agricultural managers;
Transportation and Material Moving	89	14.0%	Shuttle drivers and chauffeurs; driver/sales workers and truck drivers; transit and intercity bus drivers
Construction	61	9.6%	Plumbers, pipefitters, and steamfitters; electricians; carpenters
Production	57	9.0%	Inspectors, testers, sorters, samplers, and weighers; first-line supervisors of production and operating workers; metal workers and plastic workers
Farming, Fisheries, and Forestry	52	8.2%	First-line supervisors of farming, fishing, and forestry workers; agricultural product graders and sorters; miscellaneous agricultural workers
Office and Administrative Support	41	6.4%	Production, planning, and expediting clerks; shipping, receiving, and inventory clerks; secretaries and administrative assistants

Note: Figures in table are rounded.

IRA-8. OHIO ESTIMATES

Prevalent Job Types in *IRA-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through: **Agriculture**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Management	105	21.2%	Construction managers; computer and information systems managers; farmers, ranchers, and other agricultural managers
Personal Care and Service	75	15.1%	Childcare workers; recreation workers; animal caretakers
Arts, Design, Entertainment, Sports, and Media	42	8.4%	Producers and directors; artists and related workers; broadcast, sound, and lighting technicians
Office and Administrative Support	41	8.3%	First-line supervisors of office and administrative support workers; general office clerks; customer service representatives
Farming, Fisheries, and Forestry	41	8.2%	Agricultural product graders and sorters; first-line supervisors of farming, fishing, and forestry workers; miscellaneous agricultural workers
Business Operations Specialists	40	8.0%	Human resources workers; market research analysts and marketing specialists; project management specialists
Building and Grounds Cleaning and Maintenance	33	6.6%	First-line supervisors of landscaping, lawn service, and groundskeeping workers; janitors and building cleaners; landscaping and groundskeeping workers
Education, Training, and Library	27	5.4%	Tutors; librarians and media collections specialists; archivists, curators, and museum technicians

Note: Figures in table are rounded.

IRA-9. OHIO ESTIMATES

Prevalent Job Types in *IRA-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Lands**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Building and Grounds Cleaning and Maintenance	64	23.8%	First-line supervisors of housekeeping and janitorial workers; tree trimmers and pruners; first-line supervisors of landscaping, lawn service, and groundskeeping workers
Education, Training, and Library	42	15.5%	Postsecondary teachers; librarians and media collections specialists; archivists, curators, and museum technicians
Personal Care and Service	40	14.8%	Childcare workers; recreation workers; animal caretakers
Arts, Design, Entertainment, Sports, and Media	28	10.6%	Editors; artists and related workers; broadcast, sound, and lighting technicians
Office and Administrative Support	22	8.3%	Customer service representatives; first-line supervisors of office and administrative support workers; secretaries and administrative assistants
Management	20	7.3%	Marketing managers; computer and information systems managers; education and childcare administrators
Protective Service	14	5.3%	Crossing guards and flaggers; officers; protective service workers; guards and gambling surveillance officers

Note: Figures in table are rounded.

IRA-10. OHIO ESTIMATES

Prevalent Job Types in *IRA-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Environmental Justice and Community Resilience**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Transportation and Material Moving	23	16.6%	Refuse and recyclable material collectors; supervisors of transportation and material moving workers; driver/sales workers and truck drivers
Business Operations Specialists	22	15.7%	Market research analysts and marketing specialists; project management specialists; human resources workers
Management	21	14.9%	Sales managers; social and community service managers; marketing managers
Building and Grounds Cleaning and Maintenance	21	14.9%	First-line supervisors of housekeeping and janitorial workers; janitors and building cleaners; landscaping and groundskeeping workers
Office and Administrative Support	9	6.4%	First-line supervisors of office and administrative support workers; secretaries and administrative assistants; shipping, receiving, and inventory clerks

Note: Figures in table are rounded.

EMPLOYMENT IMPACTS IN OHIO OF CHIPS:
Creating Helpful Incentives to Produce Semiconductors

Job Creation in Ohio Through Investment Categories:
Across All Industries

CHIPS-1. OHIO ESTIMATES
Jobs Created Across *All Industries* by CHIPS Major Investment Category with Budgetary Figures

CHIPS Investment Category	All Sectors Jobs/ $1 Million				Annual Budget	Annual Job Creation				Job Years Created over 5 Years	
	Direct Jobs	Indirect Jobs	Induced Jobs	Total Jobs		Direct Jobs	Indirect Jobs	Induced Jobs	Total Jobs	Total Budget	Total Job Years
1. Manufacturing	1.9	1.5	1.5	5.0	$2,554.4 million	4,971	3,791	3,952	12,713	$12,772.2 million	63,567
2. Research and Development	5.1	2.0	2.4	9.5	$208.0 million	1,061	422	495	1,978	$1,040.0 million	9,892
3. Defense	5.1	1.7	2.2	9.1	$35.2 million	181	60	78	319	$176.0 million	1,594
Totals	--	--	--	--	$2,797.6 million	6,213	4,273	4,525	15,011	$13,988.2 million	75,054

Note: Due to rounding, direct, indirect, and induced job multipliers, within row, may not sum to "Total" job multiplier. This table includes the jobs created across all industries.

Indicators of Job Quality and Workforce Demographics in Ohio Within Investment Categories

CHIPS-2. OHIO ESTIMATES

Indicators of Job Quality in *CHIPS-Related Employment* by Major Investment Category: Direct Jobs Only

	1. Total Ohio Workforce	CHIPS Investment Categories			
		2. Total CHIPS Workforce	3. Manufacturing	4. Research and Development	5. Defense
Average (median) hourly wage	$22.50	$27.05	$27.05	$24.50	$26.05
Health insurance coverage, percentage	51.8%	52.5%	53.4%	48.2%	54.4%
Retirement plans, percentage	47.9%	50.0%	49.7%	50.3%	55.1%
Union membership	13.4%	8.1%	9.1%	3.9%	5.1%

Notes: Wages are in 2023 dollars. Health insurance coverage indicates the share of jobs with employer-sponsored health insurance. Retirement plans indicate the share of jobs with employers that offer retirement plans. To get sufficient sample sizes, samples across time and a select number of states have been pooled. See main text for details.

CHIPS-3. OHIO ESTIMATES

Educational Credentials and Race/Gender Composition of Workers in CHIPS-Related Employment by Major Investment Category: Direct Jobs Only

		CHIPS Investment Categories			
	1. Total Ohio Workforce	2. Total CHIPS Workforce	3. Manufacturing	4. Research and Development	5. Defense
Educational credentials					
Share with less than high school degree	6.7%	5.9%	6.9%	1.9%	0.5%
Share with high school degree only	29.9%	27.6%	32.3%	9.2%	7.7%
Share with some college, no degree	16.8%	14.9%	15.5%	12.4%	11.6%
Share with Associate's degree *(occupational/ vocational or academic)*	10.8%	9.7%	11.1%	4.2%	3.8%
Share with Bachelor's degree or higher	35.8%	42.0%	34.2%	72.3%	76.5%
Racial and gender composition of workforce					
Pct. White, non-Latinx	78.8%	85.7%	86.1%	84.4%	82.4%
Pct. BIPOC *(incl. Latinx)*	21.2%	14.3%	13.9%	15.6%	17.6%
Pct. Black, non-Latinx	13.1%	5.9%	5.2%	8.7%	8.5%
Pct. Asian, non-Latinx	3.0%	2.3%	2.0%	3.3%	5.8%
Pct. American Indian/Aleut/ Eskimo, non-Latinx	0.1%	0.1%	0.0%	0.5%	0.1%
Pct. Other*, non-Latinx	0.8%	1.1%	1.4%	0.2%	0.6%
Pct. Latinx**	4.5%	5.0%	5.5%	2.9%	2.6%
Pct. Men***	52.6%	73.8%	80.6%	46.4%	49.2%
Pct. Women***	47.4%	26.2%	19.4%	53.6%	50.8%

Notes: *"Other" includes the following groups: Hawaiian/Pacific Islanders and multi-racial.
** The CPS survey, on which these data are based, asks respondents to identify whether they are "Spanish, Hispanic, or Latino." We use Latinx here because of the growing usage of this ethnic category to identify people with Latin American, as opposed to, Spanish heritage. We use Latinx to be more inclusive across gender categories.
***Labor Department data include only binary gender categories.
To get sufficient sample sizes, samples across time and a select number of states have been pooled. See main text for details.

Prevalent Job Types in Ohio Within Investment Categories

CHIPS-4. OHIO ESTIMATES

Prevalent Job Types in *CHIPS-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Manufacturing**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Construction	1,253	25.2%	Electricians; first-line supervisors of construction trades and extraction workers; construction laborers
Management	942	19.0%	Computer and information systems managers; chief executives; purchasing managers
Production	543	10.9%	Machinists ; welding, soldering, and brazing workers; first-line supervisors of production and operating workers
Architecture and Engineering, and Technicians	489	9.8%	Industrial engineers; electrical and electronics engineers; mechanical engineers
Office and Administrative Support	431	8.7%	Bookkeeping, accounting, and auditing clerks; executive secretaries and executive administrative assistants; customer service representatives
Installation, Maintenance, and Repair	280	5.6%	Telecommunications line installers and repairers; heavy vehicle and mobile equipment service technicians and mechanics; industrial and refractory machinery mechanics

Note: Figures in table are rounded.

CHIPS-5. OHIO ESTIMATES

Prevalent Job Types in *CHIPS-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Research and Development**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Education, Training, and Library	220	20.8%	Secondary school teachers; teaching assistants; postsecondary teachers
Management	177	16.6%	Computer and information systems managers; medical and health services managers; education and childcare administrators
Life, Physical, and Social Science	160	15.1%	Chemical technicians; medical scientists; life, physical, and social science technicians
Office and Administrative Support	111	10.4%	Data entry keyers; secretaries and administrative assistants; first-line supervisors of office and administrative support workers
Computer and Mathematical	64	6.1%	Web developers; network and computer systems administrators; software developers
Business Operations Specialists	60	5.6%	Management analysts; market research analysts and marketing specialists; human resources workers

Note: Figures in table are rounded.

CHIPS-6. OHIO ESTIMATES

Prevalent Job Types in *CHIPS-Related Employment* by Major Investment Category: Direct Jobs Only

Job categories with 5 percent or more employment

Job Creation Through**: Defense**

Job Category	Number of Direct Jobs	Percentage of Direct Jobs	Representative Occupations
Education, Training, and Library	38	20.8%	Archivists, curators, and museum technicians; teaching assistants; postsecondary teachers
Management	32	17.5%	Computer and information systems managers; medical and health services managers; education and childcare administrators
Life, Physical, and Social Science	28	15.4%	Medical scientists; physical and social science technicians
Office and Administrative Support	16	8.9%	Receptionists and information clerks; data entry keyers; secretaries and administrative assistants
Business Operations Specialists	11	6.2%	Meeting, convention, and event planners; human resources workers; project management specialists
Computer and Mathematical	11	5.9%	Computer support specialists; software developers; network and computer systems administrators

Note: Figures in table are rounded.

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