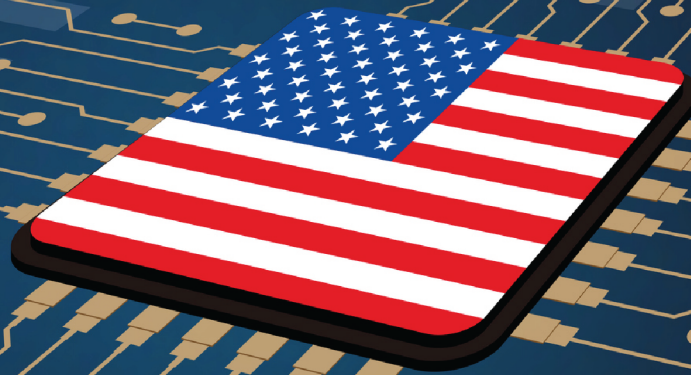


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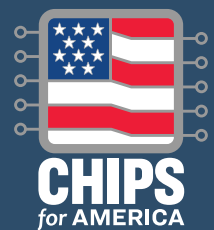


Workforce Development Planning Guide

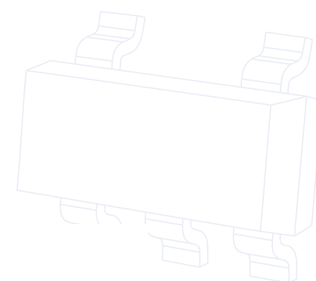
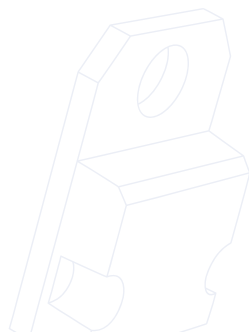
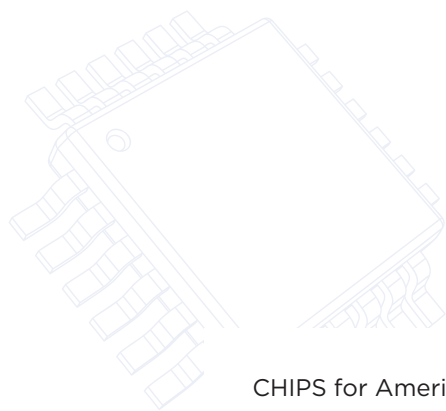
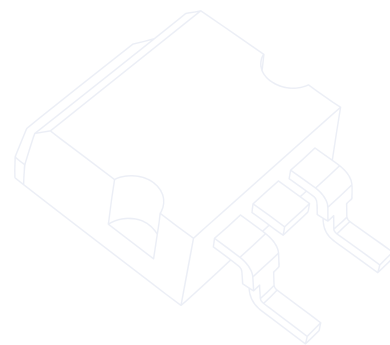
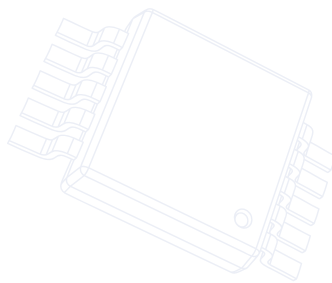
Guidance for CHIPS Incentives
Applicants

CHIPS Program Office

March 27, 2023



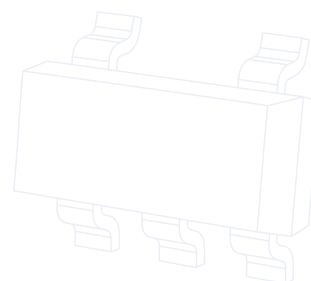
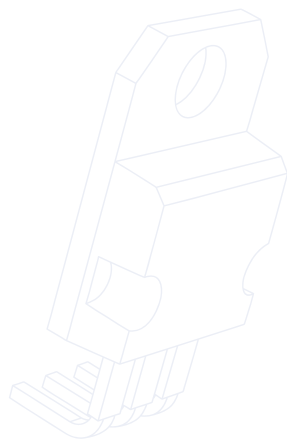
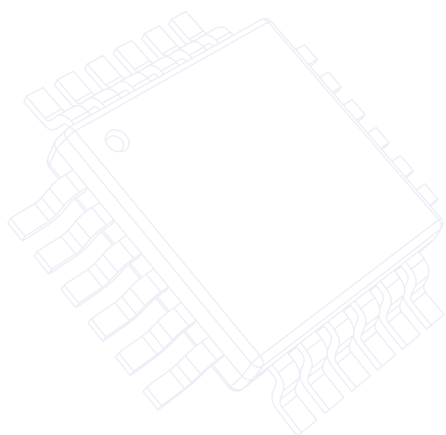
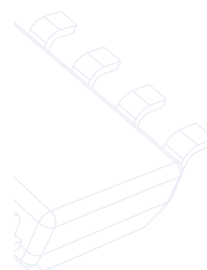
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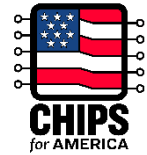


CHIPS for America includes the CHIPS Program Office, responsible for semiconductor incentives, and the CHIPS Research and Development Office, responsible for R&D programs, that both sit within the National Institute of Standards and Technology (NIST) at the Department of Commerce.

NIST promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. NIST is uniquely positioned to successfully administer the CHIPS for America program because of the bureau's strong relationships with U.S. industries, its deep understanding of the semiconductor ecosystem, and its reputation as fair and trusted.

Visit <https://www.chips.gov> to learn more.





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Executive Summary

The CHIPS Incentives Program, authorized by section 9902 of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 (“CHIPS Act”), aims to strengthen U.S. economic and national security, including economic resilience and competitiveness, through long-term growth and economic sustainability in the domestic semiconductor industry. The CHIPS Incentives Program is administered by the CHIPS Program Office within the National Institute of Standards and Technology (NIST) of the United States Department of Commerce (Department).

The CHIPS Incentives Program will seek to assure a sufficient, sustainable, reliable, and secure domestic semiconductor ecosystem, including for national security needs and critical industries through the construction, expansion, and modernization of semiconductor facilities. The CHIPS Incentives Program can provide funding for eligible projects via direct funding (grants, cooperative agreements, or other transactions), loans, and loan guarantees. The financial assistance is intended to incentivize investment related to fabrication, assembly, testing, packaging, or production of semiconductors, materials used to manufacture semiconductors, or semiconductor manufacturing equipment.

For the CHIPS Incentives Program to be successful, the domestic semiconductor industry must enable and sustain a vibrant domestic industry that supports quality jobs, a skilled and robust workforce, and a diverse supplier base of large and small firms, while supporting a high-volume semiconductor manufacturing and benefiting the broader U.S. economy.

The CHIPS Program Office offers this Workforce Development Guide as a resource for applicants responding to the February 2023 Notice of Funding Opportunity (NOFO) for the construction and expansion of commercial leading-edge, current, and mature node fabrication facilities under the CHIPS Incentives Program. This Guide is supplemental to the NOFO and is for informational purposes only.

Under the CHIPS Act, and as stated in the NOFO, the applicant must document workforce needs and provide a strategy to meet such workforce needs via a workforce development plan.¹ The workforce development plan must demonstrate appropriate investments and commitments to recruit, train, hire, retain, and upskill a skilled and diverse workforce. Workforce development plans should describe specific commitments of proactive employer engagement and mobilization and efforts to train and hire workers into good jobs that offer competitive wages, including by offering programs to expand employment opportunities for economically disadvantaged individuals.² The workforce development plan must also demonstrate secured commitments from regional educational and training entities and institutions of higher education to provide workforce training, including programming for training and job placement of economically disadvantaged individuals.³

¹ 15 U.S.C. § 4652(a)(2)(B)(ii)(VI).

² 15 U.S.C. § 4652(a)(2)(B)(ii)(II).

³ 15 U.S.C. § 4652(a)(2)(B)(ii)(III).

A highly-skilled, diverse workforce is critical to meeting the goals of the CHIPS Incentives Program. This includes both the construction workforce who construct or expand facilities, and the semiconductor workforce who operate them. The applicant will need a strategy for both workforce components.

Workforce Development Plans should have three components:

- a) Facility Workforce Plan
 - i. Workforce Needs Assessment
 - ii. Worker Recruitment and Retention
 - iii. Good Jobs Principles Approach
 - iv. Workforce Training and Wraparound Services
 - v. Metrics and Milestones
- b) Construction Workforce Plan
 - i. Workforce Needs Assessment
 - ii. Worker Recruitment and Retention
 - iii. Good Jobs Principles Approach
 - iv. Workforce Training and Wraparound Services
 - v. Metrics and Milestones
- c) Child Care Plan (required for applicants requesting CHIPS Direct Funding over \$150 million and strongly encouraged for other applicants)

In implementing the CHIPS Incentives Program, the CHIPS Program Office aims to support the Biden-Harris Administration's goal to build a stronger and more secure future and the following principles, as set forth in Executive Order 14080, "Implementation of the CHIPS Act of 2022," to:

- Protect taxpayer dollars
- Meet economic and national security needs
- Ensure long-term leadership in the sector
- Catalyze private sector investment
- Generate benefits for a broad range of stakeholders and communities
- Strengthen and expand regional manufacturing and innovation ecosystems⁴

This Guide provides examples of strategies applicants can use to meet the goals outlined in the NOFO. This Workforce Development Planning Guide includes:

- **CHIPS workforce values** to help applicants align their workforce development plans in keeping with the requirements of the CHIPS Act, the workforce values of the CHIPS Program Office, and the Department of Commerce's guidance for the creation of good jobs
- Benefits of **sectoral partnerships** and strategies for developing relationships
- A breakdown of the **Facility Workforce Plan** requirements as described in the NOFO and strategies for achieving success
- Information related to developing a **Construction Workforce Plan**

⁴ "Executive Order 14080 of August 25, 2022, Implementation of the CHIPS Act of 2022," *Code of Federal Regulations*, title 3 (2022): 52847-52849.

- Implementation strategies for the **Child Care Plan**
- **Guidance for application submission** as it relates to the workforce development plan
- An Appendix with numerous resources on **industry specific workforce development** and general information about workforce and labor

The Department supports the development of an equity-driven workforce that that supports job creation in the United States and expands employment opportunity for economically disadvantaged individuals.⁵ Please visit the CHIPS workforce development site for updates and more information.⁶

The below guide is for informational purposes only and is intended solely to assist potential applicants in better understanding the CHIPS Incentives Program and the application requirements set forth in the NOFO for this program. The guide does not and is not intended to supersede, modify, or otherwise alter applicable statutory or regulatory requirements, or the specific application requirements set forth in the NOFO. In all cases, statutory and regulatory mandates, and the requirements set forth in the NOFO, shall prevail over any inconsistencies contained in the below guide.

Any reference to a non-federal organization or corporation does not convey endorsement or approval by the Department of Commerce of the entity or their programs or resources. All examples provided are for illustrative, non-exhaustive purposes only. The Department of Commerce does not guarantee the accuracy or completeness of the information contained therein.

⁵ 15 U.S.C. § 4652(d); 15 U.S.C. § 4652(a)(2)(B)(ii)(II).

⁶ "Workforce Development," Chips.gov (NIST, February 21, 2023), <https://www.nist.gov/chips/workforce-development>.

Message from the Secretary

Thanks to President Biden's leadership and bipartisan work in Congress, the Commerce Department is investing approximately \$50 billion to grow a vibrant U.S. semiconductor industry. The CHIPS for America program will unleash the next generation of American innovation, protect our national security, and preserve our global economic competitiveness for decades to come.

It will also create good jobs with the potential to change lives, offer family-sustaining wages and benefits, and lead to long-term careers.

America's workers have the knowledge, drive, grit, and determination to do these jobs well. By making smart investments in workforce development and job training, companies will ensure workers have the opportunities and skills they need to succeed, whether they're constructing the fabs or making chips inside of them.



Commerce believes that we won't be able to build the semiconductor workforce needed unless more of America's workers have the chance to get into these jobs. Our diversity is our strength. With CHIPS for America, Commerce will work with companies to provide more opportunities—and remove barriers to access these jobs for all Americans—including women, veterans, people of color, people with disabilities, youth, and people in rural areas.

We know that we can't do this alone. That's why we are prioritizing workforce solutions that encourage employers, training providers, workforce development organizations, education and training institutions, labor unions, and other key stakeholders to work together.

This Workforce Development Planning Guide offers supplemental information to applicants as they respond to the requirements outlined in the February 2023 CHIPS Incentives Program Notice of Funding Opportunity.

By building a vibrant semiconductor workforce that is skilled, diverse, and inclusive, we will bolster U.S. leadership and competitiveness in one of the most critical technologies of our time and ensure that more of America's workers can share in our prosperity. Thank you for your role in making that vision a reality.

Secretary Gina Raimondo

1. CHIPS Workforce Values

Projects awarded funds by the CHIPS Incentives Program will create good-paying jobs that benefit American workers, including economically disadvantaged individuals⁷ and communities underrepresented in the industry. The program will prioritize workforce solutions that enable employers, training providers, workforce and economic development organizations, community-based groups, education and training institutions, labor unions, and other key stakeholders to work together. To build a workforce that enables a successful domestic semiconductor industry, the Department is encouraging more paid training, experiential learning opportunities, Registered Apprenticeship, and other high-quality work and learn programs; increased provision of wraparound services; and other creative recruitment and retention strategies; and a commitment by employers to hire workers based on their acquired skills.

Applicants should submit workforce development plans that align with the workforce values and best practices outlined in this Guide. These values and best practices collectively aim to ensure sustainable career pathways to meet employers' need for talent and to connect American workers to good jobs. To attract workers and expand employment opportunity, workplaces should be diverse, equitable, inclusive, and accessible to every worker.⁸ These efforts will support employer needs and have a lasting positive economic, social, and health benefits for years to come.

1.1 Highly Effective Workforce Investments

The Department's workforce development agenda is guided by a set of best practices and principles. The Department encourages applicants to consider these practices when planning CHIPS Act-related workforce investments. Highly effective workforce investments:⁹

- Are employer led to ensure skilled workers are connected to quality job opportunities.
- Are guided by multiple community partners such as educational institutions, labor unions, community-based organizations, workforce development organizations, and economic development organizations.
- Include wraparound services to expand employment opportunity for economically disadvantaged individuals.
- Increase educational and workplace diversity, equity, and inclusion.
- Prioritize proven earn and learn models like Registered Apprenticeships.

⁷ Individuals whose ability or opportunity to compete in the economy has been impaired due to an individual's (1) membership in a group that has been subjected to racial or ethnic prejudice or cultural bias within American society; (2) gender; (3) veteran status; (4) limited English proficiency; (5) disability status; (6) long-term residence in an environment isolated from the mainstream of American society; (7) membership in a Federally or state-recognized Indian Tribe; (8) long-term residence in a rural community; (9) residence in a U.S. territory; (10) residence in a community undergoing economic transitions (including communities impacted by the shift towards a net-zero economy or deindustrialization); (11) individuals without a college degree; or (12) membership in another "underserved community." National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 74. <https://www.grants.gov/web/grants/view-opportunity.html?oppld=346349>.

⁸ "Equity," U.S. Department of Commerce (U.S. Department of Commerce, November 3, 2022), <https://www.commerce.gov/equity>.

⁹ "Workforce Development," U.S. Department of Commerce (U.S. Department of Commerce, September 9, 2022), <https://www.commerce.gov/issues/workforce-development>.

- Lead to stackable, industry-recognized credentials and ensure that information about credentials is publicly accessible through the use of linked open data formats that support full transparency and interoperability.
- Measure and evaluate outcomes such as workers' employment and earnings. Ensure that data is transparent, actionable, and linked back to entities executing workforce programs.
- Build sustainable systems and partnerships that endure to serve employers and workers beyond the federal investment.
- Connect workforce development to economic development.
- Are coordinated across the Federal government.
- Encourage the use of other government and private funding.

1.2 Good Jobs Principles

Good jobs are the foundation of an equitable economy that lifts up workers and families and makes businesses more competitive globally. The Departments of Commerce and Labor partnered to develop Good Jobs Principles, which create a framework for workers, businesses, labor unions, advocates, researchers, state and local governments, and federal agencies for a shared vision of job quality.¹⁰ CHIPS Incentives Program applicants are expected to incorporate aspects of this framework into their workforce development plans, as stated in the NOFO, to ensure jobs to construct, expand, modernize, and operate semiconductor facilities are high quality.¹¹ To receive funds, each applicant must commit to appropriate investments to recruit, train, hire, retain, and upskill workers in good jobs that employer needs.

The Good Jobs Principles cover eight core concepts: recruitment and hiring; benefits; diversity, equity, inclusion, and accessibility (DEIA); empowerment and representation; job security and working conditions; organizational culture; pay; and skills and career advancement. See [section 3.3](#) of this Guide for more information on Good Jobs.

1.3 Women in Construction

Secretary Raimondo announced in October 2022 a goal of seeing an additional one million women join the construction industry over the next decade, roughly doubling women's representation in the industry.¹² Through the American Rescue Plan, the Bipartisan Infrastructure Law, the CHIPS Act, and the Inflation Reduction Act, trillions of dollars are being invested in ways that dramatically increase the demand and employment opportunities for highly skilled construction workers in a wide array of occupations.

¹⁰ "Good Jobs Principles," U.S. Department of Labor (U.S. Department of Commerce and U.S. Department of Labor, 2022), <https://www.dol.gov/sites/dolgov/files/goodjobs/Good-Jobs-Summit-Principles-Factsheet.pdf>.

¹¹ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 50-51. <https://www.grants.gov/web/grants/view-opportunity.html?oppId=346349>

¹² "Secretary Raimondo Calls for More Women in the Construction Industry at NABTU Tradeswomen Build Nations 2022 Conference," U.S. Department of Commerce (U.S. Department of Commerce, November 8, 2022), <https://www.commerce.gov/news/blog/2022/10/secretary-raimondo-calls-more-women-construction-industry-nabtu-tradeswomen-build>.

Although women make up a majority of the population and 44 percent of the U.S. workforce, women make up only 10 percent of the construction industry—of which only a fraction are directly employed in construction and extraction trades. Of the 11.3 million construction workers in the United States, only 1.2 million of them are women. The disparity between men and women is even worse in some construction occupations, with women making up less than 2 percent of carpenters, 3 percent of all first-line construction managers, and 3 percent of all construction laborers.¹³

Actions to broaden outreach to include women in the construction industry can be found in [section 4.3](#) of this Guide.

¹³ “Employment and Earnings by Occupation,” DOL (U.S. Department of Labor, 2019), <https://www.dol.gov/agencies/wb/data/occupations>.

2. Partnerships

Partnerships will play an integral role in the development and implementation of high-quality workforce development strategies. Applicants must secure commitments from strategic partners, including partnerships with regional educational and training entities and institutions of higher education to provide workforce training, including programming for training and job placement of economically disadvantaged individuals.¹⁴

The Department considers essential and strongly encourages the development of sectoral partnerships to ensure that immediate and long-term pathways are created for local workforces to operate facilities. These partnerships may include other employers with shared skills needs, education and training providers (such as high schools, career and technical education providers, community colleges, higher education institutions), the public workforce system, labor unions, and community-based and other worker-serving organizations. A best practice for a sectoral partnership is to identify a trusted partner to serve as a backbone entity to coordinate these entities and manage the partnership. In strong applications, a sectoral partnership will drive the workforce development plan. An applicant that has not organized or participated in a sectoral partnership should explain, in its plan, why doing so was infeasible and how its workforce efforts will ensure that it has engaged partners to serve worker needs.

There is a strong evidence base that demonstrates sectoral partnerships' effectiveness in serving the needs of employers and workers.¹⁵ By participating in sectoral partnerships, education and training providers will discover the skills needed by businesses as they develop learning pathways for the future workforce. Employers benefit from an increased supply of skilled workers and an education and training system aligned to their needs. State and local economic and workforce development organizations understand industry needs, including creating the conditions for industry retention and growth and attracting new industries to their area to create more jobs for Americans in the communities where they live. Sectoral partnerships heighten the chance of job placement in the community after training program completion given their connection to real-time employer demand and can lead to greater retention through the development of career paths.¹⁶

These partnerships drive employers from the same industry to collaborate with one another and align partners' strategies around common industry challenges including:

¹⁴ 15 U.S.C. § 4652(a)(2)(B)(III).

¹⁵ Examples include Jeffrey Liebman and Gina Raimondo, "Chapter 4: A Good Job at the End of Training: Rhode Island's Outcomes - Focused Approach to Workforce Development," in *Workforce Realigned: How New Partnerships Are Advancing Economic Mobility* (Social Finance, Federal Reserve Bank of Atlanta Federal Reserve Bank of Philadelphia, 2021), pp. 86-101; Jessica Ziegler, "Sector Strategies: Aligning the Skills of the Workforce with the Needs ...," U.S. Department of Labor (Mathematica Policy Research, U.S. Department of Labor, Social Policy Research Associates, November 2015), https://wdr.doleta.gov/research/FullText_Documents/ETAOP-2016-05_Sector%20Strategies%20-%20Aligning%20the%20Skills%20of%20the%20Workforce%20with%20the%20Needs%20of%20Employers.pdf. ; Kate Dunham, Lea Folsom, and Jeanne Bellotti, "Employer Engagement Strategies in Regional Partnerships," U.S. Department of Labor (U.S. Department of Labor, Mathematica Policy Research, America's Promise Grants, Social Policy Research Associates, March 2022), https://wdr.doleta.gov/research/FullText_Documents/ETAOP2022-48-Employer_Engagement_Strategies_in_Regional_Partnerships.pdf.

¹⁶ Katz, Lawrence F., Jonathan Roth, Richard Hendra, and Kelsey Schaberg. "Why do sectoral employment programs work? Lessons from WorkAdvance." *Journal of Labor Economics* 40, no. S1 (2022): S249-S291.

- Aligning the workforce needs of local businesses and non-profit organizations with the learning objectives of education and training providers.
- Leveraging a corresponding workforce framework for the industry.
- Increasing the pipeline of students and young people pursuing careers in the industry.
- Training more Americans to move them into middle class jobs in the industry.
- Supporting local economic development efforts to stimulate job growth.

Guidance from the NOFO. Sectoral partnerships will play an integral role in the development and implementation of high-quality, equitable workforce development strategies. As such, the Department will require all applicants' workforce development strategies to reflect the following steps:

- Applicants must secure commitments from strategic partners, including partnerships with regional educational and training entities and institutions of higher education to provide workforce training. The strongest applicants will, wherever possible, engage in sectoral partnerships so they have the broadest view of potential workforce solutions. For example, rather than partnering with only a single community college, an applicant might instead partner with a community college system to engage the full range of potential community college partners in the region. Strategic partners can include:
 - Other businesses
 - Government organizations (e.g., Federal, state, local, tribal)
 - Educational institutions (e.g., K-12, community colleges, technical colleges and universities, historically Black colleges and universities, tribal colleges and universities, and minority serving institutions, including Hispanic-serving institutions)
 - Training organizations
 - Economic development organizations
 - Workforce development organizations (e.g., state and local workforce boards)
 - Labor unions and other labor organizations
 - Industry associations
 - Community-based organizations (e.g., non-profits, faith-based organizations)
 - Career and technical education programs and career and technical student organizations for students in public secondary schools and community and technical colleges
- Applicants must describe the constitution and layout of partnerships they have formed, as well as plans to utilize these partnerships on an ongoing basis, such as through regular convening. Applicants should also describe the roles and responsibilities each partner will take on as part of their plan.
- Applicants must develop an equity strategy, in concert with their partners, to create equitable workforce pathways for economically disadvantaged individuals in their region. Recruiting, training, and retaining a diverse and skilled set of workers will necessitate building new pipelines for workers, including specific efforts to attract economically disadvantaged individuals and promote diversity, equity, inclusion, and accessibility.

Applicants are encouraged to make efforts to co-lead or to participate in a partnership beginning early in the CHIPS project workforce development planning process and continuing throughout its duration. Applicants are encouraged to find other businesses in the industry or related

industries in their region and collaborate with partners such as: community colleges; high school career and technical education programs; state and local workforce boards and agencies; economic development organizations, higher education institutions including historically black colleges and universities (HBCUs), Tribal Colleges and Universities (TCUs), and minority-serving institutions (MSIs); labor unions, and community-based organizations. Applicants are also encouraged to identify a neutral, trusted, and credible intermediary that convenes and serves as a liaison between businesses and the full range of partners, also known as a backbone organization. The partnership should include representation from other businesses with related hiring needs, including any on-site and other relevant suppliers.

Applicants are expected to develop their workforce development plan in collaboration with their partners. In their workforce plan, applicants should include letters of commitment from education and training entities and institutions that detail the specific tasks they will perform in support of the workforce plan and the resources that will be provided.¹⁷ The Department considers this collaboration essential to inform the development and implementation of effective, equity-focused workforce plans that create immediate and long-term pathways for local workers to operate facilities for decades to come.

Strategies

A critical aspect of establishing a sectoral partnership is to identify a strong backbone organization, an intermediary that convenes and coordinates between parties, serving as a liaison between businesses and the full range of partners. Backbone organizations provide a clarity of purpose, drive long-term momentum and growth, establish strong partnership identity by connecting and aligning people and activities, and define clear measures of success.¹⁸

Building partnerships is a process and it takes time to identify complementary strengths and interests, define where and how to engage, and to consider the roles and responsibilities of each party.¹⁹ There is not one defined process that works for each region or project. However, there are best practices that can help sectoral partnerships achieve success.²⁰

- **Have the right organizations and people at the table.** Sectoral partnerships center on a critical mass of business leaders from the targeted industry sector. It is essential to recruit business leaders who are decision-makers in their companies and who understand that the success of their business is tied to the broader success of the industry and the region. Recruiting strong industry champions is an important first step in building a sectoral partnership. Likewise, a sector partnership depends on a coordinated team of public and non-profit partners playing supportive roles to implement partnership priorities. Each organization should strive to place people on the project that are

¹⁷ See 15 U.S.C. § 4652(a)(2)(B)(III).

¹⁸ Crespin, R., and H. Moser. "Six proven practices for backbone organizations." (2018).

¹⁹ Tess Zakaras, "How to Build a Partnership across Sectors (Q&A)," Resonance Global (Resonance, September 15, 2022), <https://www.resonanceglobal.com/blog/cross-sector-partnerships-alignment-is-the-starting-line>.

²⁰ Joseph Parilla, Ryan Donahue, and Sarena Martinez, "Institutionalizing Inclusive Growth: Rewiring Systems to Rebuild Local Economies" (Brookings Institution, April 7, 2022), <https://www.brookings.edu/wp-content/uploads/2022/04/Guidebook-report.pdf>; "12 Steps towards Successful Cross-Sector Partnerships," The Partnering Initiative (The Partnering Initiative, 2023), <https://thepartneringinitiative.org/tpi-tools/12-steps-towards-successful-cross-sector-partnerships/>.

knowledgeable, have authority to make and execute decisions, and can maintain continuity if attrition occurs. Sectoral partnerships can include a mix of K-12 schools, community colleges, other institutions of higher education, other training providers, local workforce boards, labor unions, affordable housing providers, and local employers. Participation from more than one organization of each of these types as well as from training and certification providers, economic development organizations, and other community organizations is encouraged.

- **Build trust.** Trust, transparency, and open communication are critical to successful partnerships. Each organization should understand and respect the value that others bring to the partnership.
- **Frame the problem and establish clear goals and outcomes that are relevant for each party and the partnership.** Together in the partnership, organizations should create shared goals to align actions and resources. Partnering organizations should coalesce around a unified high-level vision for the partnership and have shared values on workforce development. To the greatest extent possible, the partnership should develop a strategy that operates from a systems-level vantage point. For example, as opposed to partnering with a single community college, a sectoral partnership might instead partner with a community college system to engage the full range of potential partners. Goals should be realistic, measurable, and achievable for each party in a partnership and for the broader partnership itself. Partnerships often fail due to misalignment of goals and outcomes, or misunderstandings about timelines and deliverables.
- **Identify roles for organizations.** Partner organizations will each serve a specific role in the partnership—convener, connector, or implementer. Conveners, or backbone organizations, will help the partnerships form, create shared goals, and build consensus. Connectors help bring together the right organizations to achieve goals. Implementers take action to recruit prospective workers, provide training opportunities, and hire workers. One organization can take on tasks across different roles.
- **Document partnership roles in a Memoranda of Understanding (MOU).** Establishing an MOU creates structure to hold organizations accountable and defines roles and responsibilities of the partnership.²¹

Resources available from both private and public sources can aid in building long-term, effective sectoral partnerships. Some of these resources include:

- Department of Labor Labor-Management Resources.²²
- Workforce GPS, sponsored by the Department of Labor, provides best practices, tools, and resources on sector strategies and employer engagement.²³

²¹ “Sample Memorandum of Understanding,” Local Initiatives Support Corporation (Local Initiatives Support Corporation, 2023), <https://www.lisc.org/our-initiatives/safety-justice/cbcr/resources/tools-templates/memorandum-understanding/>.

²² “Labor Management Partnerships,” (U.S. Department of Labor, n.d.), <https://www.dol.gov/general/workcenter/labor-management-partnerships>.

²³ “Employer Engagement and Sector Strategies,” WorkforceGPS (U.S. Department of Labor, September 30, 2022), <https://nextlevelnow.workforcegps.org/resources/2022/09/28/13/18/Employer-Engagement-and-Sector-Strategies>.

- Next Generation Sector Partnership Community of Practice sponsored by the Institute for Networked Communities offers a training manual for building industry-led sectoral partnerships and provides examples of established partnerships.²⁴
- Jobs For the Future hosts a Good Jobs Challenge Community of Practice Digital Library which has resources for building sectoral partnerships designed for compliance with DOC's Good Jobs Principles.²⁵
- Wageningen Center for Development Innovation provides tools and a guide to designing and facilitating effective multistakeholder partnerships.²⁶
- The Ohio Manufacturer's Association provides guidance and templates for building, implementing, and sustaining sectoral partnerships.²⁷
- Tools for Backbones is a starting point reference for backbone organization responsibilities.²⁸

²⁴ "Next Generation Sector Partnership Training Manual," Next Generation Sector Partnership Community of Practice (Institute for Networked Communities, 2020), <https://www.nextgensectorpartnerships.com/toolkit>.

²⁵ "Good Jobs Challenge Community of Practice Digital Library," Jobs for the Future (Jobs For the Future , 2023), <https://jff.instructure.com/enroll/GF73TC>.

²⁶ "MSP Tools," MSP Guide (Wageningen Center for Development Innovation, March 18, 2022), <https://mspguide.org/msp-tools/>.

²⁷ See section A.2 of this Guide for more information.

²⁸ "Tools for Backbones - UNCG," Collective Impact Forum (Collective Impact Forum, FSG, 2023), <https://communityengagement.uncg.edu/wp-content/uploads/2014/08/Collective-Impact-Backbone-Toolkit.pdf>.

3. Facility Workforce Plan

The facility workforce development plan should demonstrate appropriate investments and commitments to create good jobs and recruit, train, hire, retain, and upskill a diverse workforce sufficient to meet the operating needs of the entire facility.

Facility workforce plans should have five components:

1. Workforce Needs Assessment
2. Worker Recruitment and Retention
3. Good Jobs Principles Approach
4. Workforce Training and Wraparound Services
5. Metrics and Milestones

Applicants are also required to consult, engage, and coordinate with workforce partners — including educational institutions, training providers, community-based organizations, labor unions, career and technical education organizations, and public-sector organizations — in formulating their workforce plan. The Department expects that applicants will engage with each of these groups, at a minimum, in formulating their plan, as projects are most likely to succeed in creating a high-skilled and inclusive workforce by committing to close and ongoing coordination with on-the-ground stakeholders. Applicants should also demonstrate a vision for long-term sustainability by engaging with educational institutions that will be key to training the next generation of workers, including working with K-12 institutions to develop and strengthen career and technical education programs.²⁹

This section walks applicants through these required components in the NOFO and provides resources and strategies that will help applicants meet the NOFO requirements and the goals outlined in the CHIPS Workforce Values.

²⁹ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication*, 50, <https://www.nist.gov/document/notice-funding-opportunity-chips-incentives-program-commercial-fabrication-facilities>.

Guidance from the NOFO. The Department believes that a strong, long-term workforce strategy is critical to the economic and national security goals of the CHIPS Act. As such, each applicant should commit to appropriate investments to recruit, train, hire, retain, and upskill a diverse workforce in good jobs at their facility. The Good Jobs Principles published by the Departments of Commerce and Labor outline the elements of a good job, including recruitment and hiring practices, pay and benefits, job security and working conditions, worker empowerment, skills and career advancement, and organizational culture.

In collaboration with its partners, each applicant must create a workforce development plan to articulate the applicant's approach to meeting their facility workforce needs. The plan should contain a detailed workforce needs assessment for the facility or facilities, and the recruitment, training, and retention strategies that address the specific workforce challenges identified in the assessment. The applicant's plan should document how the applicant will expand access for economically disadvantaged individuals, including how the applicant's recruitment, training, and retention strategies will be tailored to address the needs of these workers. The plan should also detail the applicant's engagement with strategic partners, including but not limited to labor unions, workforce development organizations, state and local workforce boards, educational institutions, and others. Strong applications will reflect an integrated, comprehensive approach to building inclusive workforce pipelines through a sectoral partnership and strategies to retain workers in good jobs. Strong applications will also demonstrate a vision for long-term sustainability. Engaging with educational institutions at all levels will be key to training the next generation of workers, including commitments to work with K-12 institutions and develop and strengthen career and technical education.

An effective workforce plan will be informed by, and demonstrate support and commitments from, a diverse set of community and public-sector entities and include evidence-informed approaches to outreach, recruiting, training, wraparound services, job placement, and advancement. See Sections IV.H.5, IV.I.10, and V.A.5 for additional detail.

In addition, the Department expects applicants to commit to working to support long-term, cross-cutting initiatives – such as competency development, curriculum design, and credentialing – that will strengthen the U.S. national semiconductor workforce. Because meeting workforce needs will require ongoing collaboration and coordination across the sector, the Department expects to engage with recipients to support workforce efforts after awards are made.

3.1 Workforce Needs Assessment

Each applicant will have unique and specific workforce needs depending on the characteristics and scope of the proposed project. Accurately assessing employer workforce needs is critical to project success. This section provides information applicants can use with their sectoral partners to determine what workforce resources are currently available, what needs will arise with CHIPS project implementation, and the resulting gaps that applicants will need to fill. This requires assessing the broader regional workforce landscape for location of the proposed project.

Applicants should assess workforce needs holistically, thinking not just about the number and type of positions the project requires, but also about the services they can provide or facilitate to recruit and retain the workers they need. Applicants should consider needs including, but not limited to, reasonable accommodations for individuals with disabilities, housing, transportation, and child care.

Guidance from the NOFO. Assessment of the workforce needs of the project (job types, skills, and workers required over time in each job type), including the necessary workforce for facility operations, on-site supplier operations, engineering, administration, and others. The applicant and their partners should map identified workforce needs to existing resources and the existing labor market to determine gaps. The analysis should also identify other workforce risks that could adversely impact the project.

Strategies

The Department recommends applicants conduct their workforce needs assessments and then consult with their sectoral partners to determine how to address their workforce needs through the partnership. Beyond determining their own needs, employers should familiarize themselves with the workforce training landscape of their region to understand the training resources already available and the current makeup of the local labor force.

Applicants are encouraged to use any data available to them to quantify their needs. This may include publicly available labor market data, internal data, or purchased data. [Section A.6.3](#) of this guide lists resources that may be used for understanding the workforce landscape.

The workforce needs, gaps, and goals will inform subsequent steps of developing the CHIPS project workforce development plan.

The Department expects each workforce development assessment to be unique to the applicant's needs, but there are some existing tools and resources available to inform applicants' processes. Examples include:

- Best Practices for regional workforce providers developed by the Project on Workforce at Harvard Summer Fellowship Series.³⁰
- Illinois Central College IT Workforce accelerator assessed employer demand.³¹
- Fillable occupational demand worksheet from The Ohio Manufacturers' Association.³²
- Workforce Needs Assessment of Missouri's Food, Agriculture and Forestry Industries.³³

³⁰ Jake Boyd and Claudia Moreno, "Ours to Solve Together: Best Practices in Employer Engagement from American Rescue Plan Programs" (Cambridge, MA: Harvard Kennedy School, 2022), p. 6, <https://www.pw.hks.harvard.edu/post/ours-to-solve-together>.

³¹ "Hired! IT Workforce Accelerator: Developing the Central Illinois Workforce through a Talent Pipeline Management System," Economic Development Agency (U.S. Department of Commerce, August 2022), <https://www.eda.gov/sites/default/files/2022-08/Illinois-Central-College-Project-Narrative.pdf>.

³² "Occupational Demand Worksheet," The Ohio Manufacturer's Association (The Ohio Manufacturer's Association, 2019), https://www.ohiomfg.com/wp-content/uploads/Occupational_Demand_Worksheet_2019_Fillable_Form.pdf.

³³ Mark C White et al., "Missouri Food, Agriculture and Forestry Workforce Needs Assessment" (University of Missouri, Missouri Agricultural Foundation, July 10, 2020),

- Workforce Needs Assessment for the Aerospace Industry in North Carolina.³⁴

3.2 Worker Recruitment and Retention

Two major workforce challenges for the semiconductor industry are recruiting and retaining diverse, high-quality talent.³⁵ American workers and the public are largely unaware of the opportunities available in the semiconductor industry, especially opportunities that will be created with forthcoming CHIPS Incentives Program investments. Manufacturing jobs are sometimes viewed as physically demanding to a degree that is out of step with the reality of advanced manufacturing today. Only one in three parents think manufacturing has good career opportunities for their children.³⁶ For workers with advanced degrees, such as engineers in the semiconductor industry, job quality is perceived as poor in comparison to jobs in adjacent fields where more flexibility, higher salaries, and positive workplace culture can present a strong draw. Attrition is high for all groups, but particularly for people from underserved communities, both in education and training programs intended to feed into the semiconductor workforce and in the semiconductor workforce itself.³⁷ For example, many women do not pursue careers in science and engineering occupations or do not advance to leadership positions because of barriers including, but not limited to, implicit and explicit sexual bias, harassment, unequal access to funding and resources, and pay inequality.³⁸

While outreach by the industry to increase public awareness is needed, the semiconductor industry can only attract and maintain talent if good jobs are available for interested workers. [Section 3.3](#) of this Guide will describe good jobs in more detail.

<https://extension.missouri.edu/media/wysiwyg/Extensiondata/Int/BusinessAndCommunity/Docs/WorkforceNeedsAssessment.pdf>.

³⁴ Susan Seymour, "Workforce Needs Assessment for the Aerospace Industry in North Carolina," Goldenleaf.org (Golden LEAF Foundation, June 2009), https://www.goldenleaf.org/wp-content/uploads/2018/03/AerospaceWNA_ExecutiveSummary.pdf.

³⁵ "Workforce Development," SEMI (American Semiconductor Academy Initiative and SEMI Foundation, 2023), <https://semi.org/en/workforce-development>.

³⁶ "Competing for Talent: Recasting Perceptions of Manufacturing," The Manufacturing Institute (The Manufacturing Institute and Deloitte, March 2022), https://www.themanufacturinginstitute.org/wp-content/uploads/2022/03/DI-ERI-The-workforce-experience-in-manufacturing-Does-manufacturing-need-to-recast-its-image_final-copy-1.pdf.

³⁷ For more information, see the following resources: Xianglei Chen and Matthew Soldner, "Stem Attrition: College Students' Paths into and out of STEM Fields," National Center for Education Statistics (NCES) (U.S. Department of Education, November 26, 2013), <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014001rev>; "Doubling Women in Semiconductor Leadership," Accenture (Accenture and Global Semiconductor Alliance, 2021), <https://www.accenture.com/content/dam/accenture/final/industry/high-tech/document/Doubling-women-semiconductor-leadership.pdf>; Brandi, N., Geisinger, D., Raj, Raman. (2012). Why They Leave: Understanding Student Attrition from Engineering Majors. International Journal of Engineering Education, 29(4), 914-925.

³⁸ This report makes actionable recommendations to leverage change and drive improvements to the systems of education, research, and employment in order to improve both the representation and leadership of women. See National Academies of Sciences, Engineering, and Medicine, *Promising Practices for Addressing the Underrepresentation of Women in Science, Engineering, and Medicine: Opening Doors*. (Washington, DC: The National Academies Press, 2020), <https://doi.org/10.17226/25585>.

Guidance from the NOFO. Describe the overall workforce development system approach and key stakeholders, as well as the applicant's commitments to worker and community investments through training and education benefits and identifying programs to expand employment opportunities for economically disadvantaged individuals. This should include commitments of financial resources of the applicant as well as other non-CHIPS Incentives resources to fund this effort in a manner that is sustainable over the long-term. Applicants should identify spending by priority (outreach, training, wraparound services, etc.).

The Department encourages the applicant to address several well-known workplace barriers. The workforce plan should reflect commitments to ensuring that all workers have access to a safe environment that is free of harassment, discrimination, and retaliation; setting clear expectations about workplace conduct and anti-harassment policies, including consequences for violating policies; and setting clear procedures for reporting misconduct in the workplace. The Department also strongly encourages applicants to identify creative recruitment and retention strategies to increase the participation of economically disadvantaged individuals. Such strategies could include skills-based hiring and removing degree requirements, setting diverse hiring slate policies, eliminating personal and demographic information from the hiring process, and conducting structured and skills-based interviews.

Strategies

The problem of attracting and retaining talent is not unique to the semiconductor industry. Successful strategies from other industries can be leveraged to increase diversity, improve job quality, tap into new pools of worker talent on the sidelines of the labor market, and provide opportunities for workers to advance their skills and career progression in the industry over time. The Department recommends applicants design specific strategies to conduct outreach to economically disadvantaged individuals and promote diversity, equity, inclusion, and accessibility.

Existing strategies and resources should be leveraged and combined with new ideas and partnerships to meet the ambitious workforce development requirements necessary to develop and grow the U.S. semiconductor industry. The commitment of financial resources to workforce development is critical for attracting and retaining talent. This section includes proven government and industry tools as well as suggestions for solutions to be built out by the recipient during implementation.

Work with Partners to Attract New Sources of Talent. Applicants are encouraged to work with organizations to conduct outreach to new sources of talent for the semiconductor industry and industry-related educational programs. These organizations include, but are not limited to, HBCUs, TCUs, MSIs, including Hispanic-Serving Institutions, Public Housing Authorities (PHAs), multi-family owners/operators, and Tribally-Designated Housing Entities. There are multiple workforce programs intended to reach specific populations whose talents are often overlooked, including Job Corps, Reentry Employment Opportunities grantees³⁹ serving

³⁹ "Reentry Employment Opportunities Grantees," Employment and Training Administration (U.S. Department of Labor, 2023), <https://www.dol.gov/agencies/eta/reentry/grantees>.

returning citizens, Jobs for Veterans State Grants,⁴⁰ and young-adult oriented YouthBuild⁴¹ grants which expose youth to experience in multiple sectors. American Job Centers⁴² provide employment services and training to many jobseekers. Multiple tribes have robust workforce development efforts, and many can leverage multiple resources towards a comprehensive employment and training plan. The Department of Labor's ApprenticeshipUSA program maintains a "Universal Outreach Tool," an online mechanism for finding organizations in a specific geographic location that work with diverse and under-represented populations.⁴³

Targeted Industry Campaigns. Applicants can increase awareness of the opportunities available in the semiconductor industry. Some efforts are already underway to increase awareness of and interest in the industry and CHIPS applicants may find opportunities to participate and contribute to existing efforts.⁴⁴ Companies can help expose more potential students to what it is like to work on the factory floor or in engineering roles in the semiconductor industry. In addition to recruitment campaigns, efforts should be made to improve working conditions and company culture where needed to adhere to the Good Jobs Principles and to make jobseekers aware of those changes. (See in [section A.3](#) of this Guide: OMA recruitment campaign kit, SEMI Foundation High Tech U and Industry Image Awareness Campaign, BYFA, MxD)

Job Quality Toolkit. The Department of Commerce Job Quality Toolkit⁴⁵ is an actionable tool that organizations can use to improve the quality of the jobs they offer. The Toolkit is rooted in the Department's Baldrige Excellence Framework⁴⁶ which has been used for almost four decades by organizations around the world to ensure the inclusion of validated leadership and management practices to enhance organizational performance and sustainability. Included in the Toolkit are recommendations for recruiting, hiring, and promoting practices that will help organizations attract and retain employees.⁴⁷

The Toolkit identifies best practices and includes information on how to implement them. The guidance for implementation encourages Toolkit users thoughtfully choose and implement the practices that best fit their organization, that will be championed by organization leaders, and that can be appropriately resourced.

⁴⁰ "Hire a Veteran," Veteran's Employment and Training Service (U.S. Department of Labor, 2023), <https://www.dol.gov/agencies/vets/employers/hire>.

⁴¹ "YouthBuild," Employment and Training Administration (U.S. Department of Commerce, 2023), <https://www.dol.gov/agencies/eta/youth/youthbuild>.

⁴² See section A.4 of this Guide for more information.

⁴³ "Universal Outreach Tool for Recruiting Under-Represented Populations," ApprenticeshipUSA (U.S. Department of Labor, 2023), <https://www.apprenticeship.gov/eoo/sponsors/recruit-and-hire/universal-outreach-tool>.

⁴⁴ The National Academies developed a strategy for infusing advanced manufacturing into undergraduate engineering education, which could be used to attract STEM undergraduate talent. See National Academies of Sciences, Engineering, and Medicine, *Infusing Advanced Manufacturing into Undergraduate Engineering Education*. (Washington, DC: The National Academies Press, 2022), <https://doi.org/10.17226/26773>.

⁴⁵ "Job Quality Toolkit," (U.S. Department of Commerce, August 4, 2022), <https://www.commerce.gov/work-us/job-quality-toolkit>.

⁴⁶ "Baldrige Excellence Framework," NIST (U.S. Department of Commerce, February 22, 2023), <https://www.nist.gov/publications/baldrige-excellence-framework>.

⁴⁷ "Recruitment & Hiring, Job Quality Toolkit," U.S. Department of Commerce (U.S. Department of Commerce, August 2022), <https://www.commerce.gov/sites/default/files/2022-08/Recruitment-Hiring-Driver-Job-Quality.pdf>.

For example, the Toolkit includes the below strategies regarding recruitment, skills-based hiring, and increasing retention.

Recruit from diverse sources of talent:

- Actively recruit and track talent from underrepresented communities at universities, community colleges, and minority-serving institutions.
- Offer job shadow programs and internships with local high schools, community colleges, Job Corps Centers, workforce intermediaries, or community-based organizations.
- Highlight inclusive benefits like child care and paid leave in job descriptions.
- Offer on-ramps to late-career workers.
- Ensure accessibility in the hiring and promotion process.

Implement skills-based hiring and promotion practices:

- Limit requirements in job descriptions to “must haves.”
- Evaluate whether credential and experience requirements in job descriptions are necessary and remove four-year and other degree requirements where appropriate.
- Narrow definitions of relevant prior experience, where appropriate, and count life experiences.
- Consider diverse hiring slate policies and remove personal and demographic information from the hiring process.
- Conduct structured and skills-based interviews.
- Where negotiation over salary is permitted, institute consistent practices and oversight to ensure equity.
- Eliminate salary history as a basis for screening applicants and setting pay.

Create a formal retention plan for your organization:

- Ask employees what makes them stay (or would make them stay). Employee surveys and focus groups can uncover opportunity blind spots (e.g., workers value more flex time over wage increases). Offer flexible benefits, not a “one size fits all” package.
- Understand and adapt to causes of turnover (i.e., inadequate child care, culture fit, job security, benefits, wages).
- Foster belonging; create a learning environment around the fundamentals of inclusivity and a psychologically safe workplace.
- Plan for succession as part of career development; be strategic about apprenticeships and cross-training to prepare more junior workers for senior positions.
- Ensure all workers have a well-articulated path for learning and performance milestones.

Skills-Based Hiring. Research shows that basing hiring decisions on skills leads to better job outcomes for workers and employers alike.⁴⁸ Applicants may consider defining work roles and

⁴⁸ Beth Berwick and Annaliese Calhoun, “Skills-Based Hiring Is Just The Beginning,” *Forbes* (Forbes Magazine, December 1, 2022), <https://www.forbes.com/sites/gradsoflife/2022/12/01/skills-based-hiring-is-just-the-beginning/?sh=7fa69f233964>; Hunter, J. E. “Hunter. RF (1984). Validity and utility of alternative predictors of job performance.” *Psychological Bulletin* 96, no. 1 (8): 72-98.

base hiring decisions on workers' skills, rather than the degrees they possess. There are several reasons skills-based hiring can improve recruitment and retention efforts:

- Allows organizations to recruit from pools of workers with adjacent skill sets, building a team on which workers complement one another's strengths and can help train one another. Demonstrated proficiency in one skillset can signal that workers have the potential to learn an adjacent skillset, facilitating re-skilling and upskilling efforts.⁴⁹
- Gives employers and job seekers a common language by defining job requirements using a commonly accepted competency model—such as the Semiconductor-Nanotechnology Manufacturing Competency Model—which improves transparency and aligns expectations.
- Allows workers to more easily re-skill or upskill to new opportunities along career pathways because it is clear what skills they must learn to qualify for different positions within the organizations.^{50 51}

Set Goals and Measure Progress. Set and publicly communicate company or project recruitment and retention goals, including for workplace diversity. Measure the baseline metric or metrics for the company's or project's workforce, and track and share progress toward stated goals. (See in [section A.3](#) of this Guide: SEMI Foundation Roadmap to Diversity, Equity, and Inclusion which includes strategies and self-assessment tools to increase recruitment and retention of a diverse semiconductor workforce; also see in [section 3.3](#) of this Guide: Good Jobs Principles, Diversity, Equity, Inclusion, and Accessibility)

3.3 Good Jobs Principles Approach

Applicants should create jobs that align with the Good Jobs Principles—good jobs help employers become more competitive by attracting and retaining talent; good jobs also provide stability, economic security, and shared prosperity for American workers.

Guidance from the NOFO. The Departments of Labor and Commerce's Good Jobs Principles provide a framework to ensure semiconductor facility jobs are high quality. The workforce development plan should describe the applicant's approach to meet these principles for newly created jobs and to increase job quality for existing jobs at expanded facilities. Additional details on the dimensions of job-quality are available on Department of Commerce's website.

⁴⁹ "To Support the US Semiconductor Industry, Hire for Skills and Potential," Eightfold (Eightfold.ai, January 4, 2022), <https://eightfold.ai/blog/semiconductor-hire-for-skills/#:~:text=In%20the%20semiconductor%20industry%2C%20several,%2C%20Simulink%2C%20and%20algorithm%20design>.

⁵⁰ For a primer on how federal funds are used to advance the American workforce system, see: "A Guide to the American Workforce System," Nexight Group (Nexight Group, November 2020), <https://nexightgroup.com/case-studies/workforce-primer/>.

⁵¹ The Career Pathways Toolkit generated by the Departments of Education and Labor and other agencies serves as a guide for anyone involved in workforce preparation to understand how to build and support career pathways, which can help improve upward mobility and identify opportunities for training and upskilling outstanding employees. See: "Career Pathways Toolkit: An Enhanced Guide and Workbook for System Development," Workforce GPS (U.S. Department of Education, October 20, 2016). https://careerpathways.workforcegps.org/resources/2016/10/20/10/11/Enhanced_Career_Pathways_Toolkit.

Good jobs are the foundation of an equitable economy that lifts up workers and families and makes businesses more competitive globally. The Departments of Commerce and Labor partnered to develop Good Jobs Principles, which create a framework for workers, businesses, labor unions, advocates, researchers, state and local governments, and federal agencies for a shared vision of job quality.⁵² CHIPS Incentives Program applicants are expected to incorporate aspects of this framework into their workforce development plans, as stated in the NOFO, to ensure jobs to construct, expand, modernize, and operate semiconductor facilities are high quality.⁵³ Each applicant should commit to appropriate investments to recruit, train, hire, retain, and upskill workers in good jobs.

The Good Jobs Principles cover eight core concepts:

Recruitment and Hiring: Qualified applicants are actively recruited—including those from underserved communities. Applicants are free from discrimination, including unequal treatment or application of selection criteria that are unrelated to job performance. Applicants are evaluated with relevant skills-based requirements. Unnecessary educational, credentials and experience requirements are minimized.

Benefits: Full-time and part-time workers are provided family-sustaining benefits that promote economic security and mobility. These include health insurance, a retirement plan, workers' compensation benefits, work-family benefits such as paid leave and caregiving supports, and others that may arise from engagement with workers. Workers are empowered and encouraged to use these benefits.

Diversity, Equity, Inclusion, and Accessibility (DEIA): All workers have equal opportunity. Workers are respected, empowered, and treated fairly. DEIA is a core value and practiced norm in the workplace. Individuals from underserved communities do not face systemic barriers in the workplace. Underserved communities are persons adversely affected by persistent poverty, discrimination, or inequality, including Black, Indigenous, people of color; LGBTQ+ individuals; women; immigrants; veterans; individuals with disabilities; individuals in rural communities; individuals without a college degree; individuals with or recovering from substance use disorder; and justice-involved individuals.

Empowerment and Representation: Workers can form and join unions. Workers can engage in protected, concerted activity without fear of retaliation. Workers contribute to decisions about their work, how it is performed, and organizational direction.

Job Security and Working Conditions: Workers have a safe, healthy, and accessible workplace, built on input from workers and their representatives. Workers have job security without arbitrary or discriminatory discipline or dismissal. They have adequate hours and predictable schedules. The use of electronic monitoring, data, and algorithms is transparent,

⁵² "Good Jobs Principles," U.S. Department of Labor (U.S. Department of Commerce and U.S. Department of Labor, 2022), <https://www.dol.gov/sites/dolgov/files/goodjobs/Good-Jobs-Summit-Principles-Factsheet.pdf>.

⁵³ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 50-51. <https://www.grants.gov/web/grants/view-opportunity.html?oppId=346349>

equitable, and carefully deployed with input from workers. Workers are free from harassment, discrimination, and retaliation at work. Workers are properly classified under applicable laws. Temporary or contractor labor solutions are minimized.

Organizational Culture: All workers belong, are valued, contribute meaningfully to the organization, and are engaged and respected especially by leadership.

Pay: All workers are paid a stable and predictable living wage before overtime, tips, and commissions. Workers' pay is fair, transparent, and equitable. Workers' wages increase with increased skills and experience.

Skills and Career Advancement: Workers have equitable opportunities and tools to progress to future good jobs within their organizations or outside them. Workers have transparent promotion or advancement opportunities. Workers have access to quality employer- or labor-management-provided training and education.

For the last principle—skills and career advancement—workers access to career pathways, including youth and young workers, is essential. The Workforce Innovation Opportunity Act (WIOA) of 2014⁵⁴ defines a career pathway as “a combination of rigorous and high-quality education, training, or other services that:

- Aligns with the skill needs of industries in the economy of the state or regional economy involved.
- Prepares an individual to be successful in any of a full range of secondary or postsecondary education options, including Registered Apprenticeships.
- Includes counseling to support an individual in achieving the individual's education and career goals.
- Includes, as appropriate, education offered concurrently with and in the same context as workforce preparation activities and training for a specific occupation or occupational cluster.
- Organizes education, training, and other services to meet the needs of an individual in a manner that accelerates the educational and career advancement of the individual to the extent practicable.
- Enables an individual to attain a secondary school diploma or its recognized equivalent, and at least one recognized postsecondary credential.
- Helps an individual enter or advance within a specific occupation or occupational cluster.”⁵⁵

See [section A.2](#) of this Guide for information on how to apply these principles to workforce development activities.

⁵⁴ Workforce Innovation and Opportunity Act 29 U.S.C ch.32 §3102(7) (2014).

⁵⁵ “Career Pathways Systems,” PCRN: Career Pathways Systems (U.S. Department of Education, 2014), <https://cte.ed.gov/initiatives/career-pathways-systems>.

3.4 Workforce Training and Wraparound Services

The Department estimates that as a result of ongoing ambitions to dramatically increase chip production in the United States, an estimated additional 90,000 manufacturing workers will be needed in the semiconductor industry by the end of the decade.⁵⁶

Guidance from the NOFO. The workforce development plan should include commitments to provide workforce training to address the applicant's needs. These commitments should include programming for training and job placement, including for economically disadvantaged individuals and underrepresented groups in the semiconductor industry. The Department expects applicants to develop such strategies in concert with their partners. The Department also expects that applicants may need to make additional training commitments as their efforts progress based on changing workforce needs.

Where possible, the applicant should identify existing, successful training programs that can be scaled and adapted to meet the applicant's needs, as well as their use of work-and-learn training models. To demonstrate satisfaction of the statutory requirement that the applicant secure "commitments from regional educational and training entities and institutions of higher education to provide workforce training, including programming for training and job placement of economically disadvantaged individuals," the applicant must also attach letters of commitment from education and training entities and institutions that detail the specific tasks they will perform in support of the workforce plan and the resources that will be provided, including, but not limited to, programming for training and job placement of economically disadvantaged individuals.

Applicants should make commitments to hiring individuals who complete training programs, and should also strongly consider partnering with programs that train workers with the needed skills and then provide career pathways that lead to good jobs (such as Registered Apprenticeships, pre-apprenticeships with a strong relationship with one or more Registered Apprenticeship programs, other programs at community and technical colleges with successful track records of putting students on the path to good jobs, career pathways programs in high schools, and other paid work-based learning). Applicants may also consider how they can partner with such programs and provide real-world, hands-on work-based learning opportunities to secondary and postsecondary students interested in the semiconductor industry and to workers interested in career advancement.

Finally, as part of their description of training commitments, applicants must describe any wraparound services and other barrier reductions they or their partners will provide to support facility workers' access to and completion of training, as well as transition into and progression in a job (such as adult care, child care, transportation assistance, housing assistance, emergency cash assistance, language support, tools, uniforms, equipment, application fees, and services like mentorships that aim to help retain workers, etc.).

⁵⁶ This datapoint comes from an internal estimate of the CHIPS Program Office.

Workforce training has traditionally focused on degree programs, rather than skills and competencies, and has largely struggled to adapt to changing skill needs brought on by technological change. As CHIPS investments grow, U.S. semiconductor education and workforce training efforts are better served through an approach that is skills-based, scalable, and adaptable to changing industry needs.

With their sectoral partners, CHIPS applicants should identify the training programs most appropriate for their unique project and longer-term needs. The Department recognizes that there are many training models and programs available to employers. This section presents models that have proven to be effective in meeting the skills needs of employers while also creating good jobs for American workers.

Research has found that access to wraparound supportive services, like child care and transportation, both attracts job seekers and workers to training programs and helps them persist to completion. Training strategies that are both responsive and closely connected to the needs of employers and include access to wraparound supportive services can help to ensure that businesses have the trained workforce they need.

3.4.1 Training

Applicants should provide workforce training options to recruit, train, hire, and upskill the workers required for the success of proposed CHIPS projects but should also identify training programs they will use to increase worker productivity and retention and contribute to the sustainability of the domestic semiconductor workforce.

In this effort, reskilling and upskilling programs could play a key role. Assessment questions and strategies are provided in this section to identify, scale, and develop workforce training programs that meet the Department's Good Jobs Principles and can meet the oncoming demand.

Strategies

The Department recommends applicants consider the strategies below to meet their workforce training needs.

Incorporate Registered Apprenticeships and pre-apprenticeships. Registered Apprenticeship programs and pre-apprenticeship programs that have an established relationship with one or more Registered Apprenticeship programs have a proven track record of providing strong results for both employers and workers and can help provide a pipeline for women, people of color, veterans, individuals from rural communities, formerly incarcerated individuals, people with disabilities, opportunity youth, and individuals from other underrepresented groups to participate in the semiconductor workforce. Support for such programs could come through public housing authorities with service coordination or case management to complement efforts.

Ninety-three percent of individuals who complete a Registered Apprenticeship program retain employment with an average annual salary of \$77,000.⁵⁷ Further, recent evaluation that Registered Apprenticeship can be an effective strategy for earnings growth and career on-ramp for individuals from underserved communities.⁵⁸ Furthermore, employers experience a positive return on investment to apprenticeships. For every \$100 an employer invests in RA, they can receive \$144.30 in total benefits.⁵⁹

The Department of Labor Office of Apprenticeship provides a website as a one-stop source to connect career seekers, employers, and education partners with Registered Apprenticeship resources and includes unique tools such as partner finder, occupations finder, and standards builder to accelerate partnerships and accelerate development of new programs.⁶⁰

The Department of Labor also invests in national Registered Apprenticeship technical assistance centers and workforce industry intermediaries to build employer and organizational capacity to launch and scale programs in existing, new and emerging industries. For example, the Department of Labor funds the National Institute for Innovation and Talent (NIIT) to serve as a national intermediary and they support a national strategy to attract, train, and retain talent in nanotechnology and semiconductors using registered apprenticeships and other strategies. (See in [section A.3](#) of this Guide: U.S. DOL Registered Apprenticeship, IMT, NIIT, IUE-CWA, SEMI Foundation)

Incorporate other work and learn models

Applicants are encouraged to explore how other training programs using “work and learn” models might be incorporated.⁶¹ Work and learn models vary across the spectrum, from low touch (less structured) to high touch (very structured). Some examples of work and learn models beyond Registered Apprenticeships and pre-apprenticeships are (from low touch to high touch): career fair/expos, industry tours, job shadowing, externship, paid work experience or transitional jobs, mentorships, clinical training/practicum, return ship, on-the-job training, internship, and cooperative education/co-op.⁶²

Low touch work and learn models require less engagement/fewer resources from the employer, while high touch work and learn models require high engagement/more resources from the employer. In essence, the structure is determined by a participant's general career knowledge

⁵⁷ “Explore Registered Apprenticeship,” ApprenticeshipUSA (U.S. Department of Labor, August 2022), <https://www.apprenticeship.gov/sites/default/files/dol-industry-factsheet-apprenticeship101-v10.pdf>.

⁵⁸ “Evaluation of the American Apprenticeship Initiative (AAI),” ApprenticeshipUSA (U.S. Department of Labor, n.d.), <https://www.apprenticeship.gov/evaluation-american-apprenticeship-initiative-aaai>.

⁵⁹ Siobhan Mills De La Rosa, Daniel Kuehn, Robert Lerman, and Kevin Hollenbeck, “Do Employers Earn Positive Returns to Investments in Apprenticeship? Evidence from Registered Programs under the American Apprenticeship Initiative,” American Apprenticeship Initiative (U.S. Department of Labor, October 26, 2022), <https://wdr.doleta.gov/research/details.cfm?q=&id=2727>.

⁶⁰ “ApprenticeshipUSA” (U.S. Department of Labor, n.d.), <https://www.apprenticeship.gov/>.

⁶¹ Anthony P. Carnevale, Nicole Smith, Michelle Melton, and Eric W. Price, “Learning While Earning: The New Normal,” Center on Education and the Workforce (Georgetown University, 2015), <https://files.eric.ed.gov/fulltext/ED574376.pdf>; Annelies Goger, “Desegregating work and learning through ‘earn and learn’ models” Brookings Institution (Brookings Institution, December 9, 2020), <https://www.brookings.edu/research/desegregating-work-and-learning>.

⁶² Maisha Meminger, “Paid and Unpaid Work Experience,” WorkforceGPS (U.S. Department of Labor, January 19, 2017), <https://youth.workforcegps.org/resources/2017/01/19/14/27/Paid-and-Unpaid-Work-Experience>.

to full immersion in an industry or career. The principles of a work and learn model can be adapted to the unique needs of workers and employers by, for example, paying for education and training programs or affording paid time off for classes or studying for relevant degrees. Providing work and learn programs for existing workers can help bridge skill gaps created by technological change and help high achieving workers advance. (See in [section A.3](#) of this Guide: FAME, New Manufacturing Alliance, OMA Tools for Earn-and-Learn Programs)

Partner with community colleges and technical colleges. Community and technical colleges are in every community, provide pathways to career and workforce education and training aligned to in-demand sectors, and serve as a hub for workforce development in local communities. In addition to providing high-quality occupational certificates, associate and, in some cases, bachelor's degrees, community and technical colleges can administer career and technical education programs, offer programs of study that meet the needs of a diverse array of students, and coordinate appropriate wrap around services for its students. Community colleges are eligible for Federal funding through the Workforce Innovation and Opportunity Act and can actively support skilling, reskilling, and upskilling workers in skills needed in the semiconductor industry.⁶³ Many jobs in the semiconductor workforce, such as technicians and inspectors, require specialized skills that do not require a four-year degree. Community colleges play a fundamental role in Registered Apprenticeship programs by developing and administering curricula and experiential learning opportunities that meet specific industry needs. Several community colleges have also made open educational resources available including in the semiconductor sector.⁶⁴ (See in [section A.3](#) of this Guide: AJC Community College Finder, MNT-EC, Semiconductor Technician Quick Start Program, NSF, CSCC)

Establish strong career pathways. Applicants should strongly consider partnering with programs that train workers with the needed skills, then provide career pathways that lead to good jobs. Providing on-the-job pathways for entry-level production workers to skill up into mid-level classifications and offer wage progression may help businesses retain workers. Resources on understanding career pathways and using common competency models for career pathways are discussed in [section 3.2](#) of this Guide. Additionally, applicants can look to data on “feeder occupations” with adjacent or relevant skills sets to better understand potential paths for workers.⁶⁵ (See in [section A.3](#) of this Guide: NIIT, NSER)

Build and scale career technical education programs for high school students and other learners. Career Technical Education (CTE) prepares high school, postsecondary, and adult learners with the academic and technical skills, knowledge, and training necessary to succeed

⁶³ “WIOA-Eligible Training Program Finder,” CareerOneStop (U.S. Department of Labor, 2023), <https://www.careeronestop.org/LocalHelp/EmploymentAndTraining/find-WIOA-training-programs.aspx>.

⁶⁴ “SkillsCommons,” U.S. Department of Labor (U.S. Department of Labor, 2023), www.skillscommons.org.

⁶⁵ See: Deena Schwartz, et al., “Building Better Pathways: An Analysis of Career Trajectories and Occupational Transitions,” U.S. Department of Labor, Chief Evaluation Officer (U.S. Department of Labor, December 2021), https://wdr.doleta.gov/research/FullText_Documents/Building%20Better%20Pathways_CTOT_Final%20Report.pdf; “Career Trajectories and Occupational Transitions Dashboard,” Office of the Assistant Secretary for Policy, Department of Labor (U.S. Department of Labor, n.d.), <https://www.dol.gov/agencies/oaspe/evaluation/resources/career-trajectories-and-occupational-transitions-dashboard>. For information on adjacent skills in the semiconductor industry, see: “Specializing in Semiconductors,” Lightcast (Lightcast.io, August 2022), <https://lightcast.io/resources/blog/specializing-in-semiconductors>.

in future careers and to become lifelong learners.⁶⁶ Successful high school CTE programs can position students to enter the workforce with a base of skills that position them well for job training programs with employers. CTE prepares these learners for the world of work by introducing them to career competencies and makes academic content accessible to students by providing it in a hands-on context.⁶⁷ Applicants may offer externships to CTE teachers to earn semiconductor industry certification to keep up with current skills and knowledge in the industry. Applicants may also work with schools to adapt curricula to continuously meet industry needs. Applicants may also consider providing CTE programs with labs, equipment, and other resources to provide students with hands-on semiconductor industry experience. (See in [section A.3](#) of this Guide: Advance CTE, MCC Semiconductor Technician Quick Start Program, NSER, Alexandria Public Schools CTE: Technology Education⁶⁸)

Establish education-to-workplace manufacturing pipelines. Many work roles in the semiconductor field do not require a postsecondary degree but provide higher than average wages. Applicants may consider partnering with local high schools, especially technical high schools, Job Corps Centers, community colleges, WIOA Youth Programs, and American Job Centers to bring awareness and training programs to all young people, including opportunity youth. Registered Apprenticeship programs for youth between the ages of 16-24 combine academic and technical classroom instruction with work experience.⁶⁹ Applicants may cooperate with existing CTE programs to provide experiential learning opportunities and establish paid internships and school-to-work programs for high school students as pathways to full-time positions post-graduation. (See in [section A.3](#) of this Guide: NSF, NextFlex FlexFactor and Flex2Future, PowerAmerica)

Partner with unions. Collective bargaining and other labor-management partnerships enable businesses of all sizes to work with their employees' unions to address job training, safety and health, technology, and other key issues.⁷⁰ Labor-management partnerships can facilitate recruitment and provide access to stable careers with wage and skill progression, enforceable rights, and a voice at work. Joint labor-management training programs can enhance job quality and help ensure a stable supply of talent for employers; broad-based economic growth in local communities; diversity, equity, and inclusion; and accessibility in the workplace. (See in [section A.3](#) of this Guide: CWA)

Partner with state and local workforce boards. Partnering with state and local workforce boards presents a unique opportunity to design, scale, or implement concrete workforce strategies at local, regional, or the state level. Workforce boards are critical partners in helping to meet workforce needs; they are business-led and work together to support collaboration with economic development areas and ensure that career pathways, sector strategies, and

⁶⁶ "Updated: Advanced Manufacturing Sector Sheet," CTE Policy Watch (ACTE, June 30, 2021), <https://ctepolicywatch.acteonline.org/2021/06/updated-advanced-manufacturing-sector-sheet.html>.

⁶⁷ "Career Technical Education," AdvanceCTE (AdvanceCTE, n.d.), <https://careertech.org/CTE>.

⁶⁸ "CTE: Technology Education," Alexandria City Public Schools (Alexandria City Public Schools, 2023), <https://acps.cleancatalog.net/cte-technology-education>.

⁶⁹ "Youth Apprenticeship," ApprenticeshipUSA (U.S. Department of Labor, n.d.), <https://www.apprenticeship.gov/educators/youth-apprenticeship>.

⁷⁰ "Labor Management Partnerships," (U.S. Department of Labor, n.d.), <https://www.dol.gov/general/workcenter/labor-management-partnerships>.

expansion of Registered Apprenticeships and other work and learn career training approaches address the needs of businesses in diverse industries.⁷¹

Furthermore, by leveraging innovative training approaches and leveraging WIOA, state and local workforce boards are uniquely positioned to implement workforce specific training strategies. These strategies include: 1) Classroom or online training for individuals 2) On-the-job training for individuals 3) Cohort Training 4) Registered Apprenticeship programs 5) Incumbent worker training and 6) Customized training. In addition, state and local workforce boards are uniquely positioned to support wrap-around and supportive services through WIOA.

Provide flexible, tailored training opportunities to skill, reskill, and upskill. Flexible job training opportunities offered virtually and onsite can help further develop workers' skills and prepare them for taking on additional responsibilities in the future.⁷² Applicants may choose to employ work and learn models by offering benefits such as tuition assistance and sponsorship for relevant coursework. This approach can help remove barriers for workers looking to take advantage of training opportunities and can make these opportunities more accessible for all workers.

Provide equipment. In addition to wraparound services, providing laptops and digital devices required onsite or for training programs, as well as personal protective equipment in all sizes to workers of all genders, can reduce the financial barriers for individuals seeking to join trades and/or workforce development programs.⁷³

3.4.2 Wraparound Services

Wraparound services include, but are not limited to, transportation, housing, high-speed internet, child care and eldercare, parental leave, loan forgiveness, and mentorship and employee cohort programs. Applicants may provide wraparound services to improve recruitment, access, and retention into workforce development programs and employment arrangements. The availability of wraparound services during training and in the initial entry to a new job has been shown to be a key factor in attracting and retaining students and employees during education, training, and initial entry into a new job.⁷⁴

Strategies

The Department recommends the following strategies to execute appropriate and successful wraparound supportive services.

⁷¹ "What is a Workforce Development Board?" produced by National Association of Workforce Boards (YouTube, April 9, 2021), <https://www.youtube.com/watch?v=juAXERBRoIM>.

⁷² "Job Quality Toolkit," U.S. Department of Commerce (U.S. Department of Commerce, August 2022), www.commerce.gov/sites/default/files/2022-08/Job-Quality-Toolkit.pdf.

⁷³ "Identify, Train, Place: A Playbook to Build Tomorrow's Highway Construction Workforce," Federal Highway Administration (U.S. Department of Transportation, February 2021), https://www.fhwa.dot.gov/innovativeprograms/centers/workforce_dev/hcwp/pdfs/hcwp_playbook.pdf.

⁷⁴ Gaye D. Ceyhan et al., "The Socialization and Retention of Low-Income College Students: The Impact of a Wrap-Around Intervention," *International Journal of Higher Education* 8, no. 6 (2019): 249-261. <https://files.eric.ed.gov/fulltext/EJ1234479.pdf>; Darnell Cole, Christopher B. Newman, and Liane I. Hypolite, "Sense of Belonging and Mattering Among Two Cohorts of First-Year Students Participating in a Comprehensive College Transition Program," *American Behavioral Scientist* 54, no. 3 (2019): 276-297. <https://doi.org/10.1177/0002764219869417>.

Assess worker needs holistically. Assessment of employee needs for wraparound intervention should be done both at a community and individual level. Applicants may work with local organizations and sector partners to understand community-wide needs that may affect all workers (e.g., lack of public transportation). To understand existing worker needs, applicants may consider a variety of feedback mechanisms including working groups or surveys.⁷⁵

Find local partners. Partnering with local organizations, including sectoral partners, can help applicants understand what needs for wraparound services are generally present in the community as well as what services may already be available from government and nonprofit organizations to fill these gaps. State and local workforce boards are unique partners with funding for supportive services through WIOA. Applicants may consider providing financial and logistical support to existing successful programs, when possible, in conjunction with targeted programs managed by the applicant to maximize the support.

Tailor wraparound services to specific groups and individuals. Different individuals will require different wraparound services for success, and the needs of an individual may change with shifts in their work situation (e.g., hours of work) or personal situation (e.g., caregiving responsibilities).

Develop ongoing communication and assessment. Applicants should prepare to engage in ongoing assessment and communication with all stakeholders to ensure wraparound services continue to be appropriate and successful.

3.5 Metrics and Milestones

The outcomes of workforce development efforts and training programs must be measured so that successful programs can be scaled, and less successful programs can be modified to improve outcomes. The ability to measure outcomes starts with setting SMART workforce development goals: Specific, Measurable, Attainable, Realistic, and Time-Bound.

- **Specific** goals consider the findings of the workforce needs assessment, including workforce demographics, goals currently in use, and barriers that affect the plan.
- **Measurable** goals to track workforce progress and measure success, such as by tracking workforce expansion, workforce demographics, the number of potential hires enrolled in training programs, etc.
- **Attainable** goals consider timelines, resources, partner capacity, and skills available to ensure that goals are doable, such as considering funding limitations and the current state of workforce demographics.
- **Relevant** goals ensure that all planned workforce objectives and targets align properly with the broader workforce plan, including requirements and additional guidance.
- **Time-bound** goals need to comply with project timelines.

⁷⁵ Patricia Miles and Neil Brown, "Wraparound Implementation Guide: A Handbook For Administrators and Managers," The National Wraparound Initiative (Portland State University, 2011), <https://nwi.pdx.edu/pdf/ImplementationGuide-Complete.pdf>.

Guidance from the NOFO. In addition, the workforce development plan must include the core milestones the program aspires to achieve (with timing), as well as metrics and processes to measure, track, and report publicly on the goals and commitments. CHIPS Incentives awardees will be expected to collect real-time, granular data that will inform the evaluation of their workforce efforts and to help track the success of their workforce commitments. Applicants will also be expected to make data publicly available in a form that protects individual worker information, including personally identifiable information. The Department will provide additional guidance on metrics at the time of award. At a minimum, applicants should be prepared to describe and subsequently report:

- Metrics and plan to collect demographically disaggregated data on outreach, recruitment, hiring, education, and outcomes (including job placement and wages) of skills training programs and upskilling efforts.
- Disaggregated data on the demographics of the workforce, including breakdowns of work hours, wages, benefits, and other measures of job quality.
- How data will be collected so that it can be evaluated in real time and the means of accountability, such as any reporting to key stakeholders.

Strategies

As noted above, the Department will provide specific guidance on the metrics it will collect from CHIPS Incentives Program recipients at the time of award and during post-award.

For the workforce development plan, applicants must list major workforce development planning milestones with an expected timeline. Applicants may wish to share current workforce data collection activities and evaluation strategies, as well as new data collection or evaluation processes they plan to enact to measure progress toward achievement of their workforce development goals and quality of training workforce training programs.

For long-term success of workforce development efforts and to sustain successful efforts, applicants may consider working with their partners to develop success measures and milestones for workforce development efforts. Suggested activities include:

- Developing an understanding of the baseline workforce in the state, using data from the workforce analysis, including workforce demographics.
- Establishing and tracking success measures to monitor progress towards workforce development plan goals. Applicants may incorporate existing metrics already identified through the workforce landscape analysis.
- Creating early feedback loops on recruiting numbers, training completion, job persistence numbers, and the use and type of wraparound services to help focus and deepen recruiting efforts, training supports, and initial employment practices.
- Regularly reassessing workforce strategies and activities based on reported performance metrics for program quality improvement.
- Working to develop an internal measure of return on investment to employee training.

- Making aggregate workforce data public, including information on demonstrating good faith efforts for recruiting, retaining, and advancing individuals from underserved communities.

Applicants may view high-level narratives of the Economic Development Administration (EDA) Build Back Better Regional Challenge awardees and the Good Jobs Challenge awardees for examples of applicant success metrics.⁷⁶ Applicants may also view the EDA Good Jobs Challenge’s Workforce Data Collection questionnaire.⁷⁷

⁷⁶ “\$1B Build Back Better Regional Challenge Finalists,” Economic Development Administration (U.S. Department of Commerce, 2023), <https://www.eda.gov/funding/programs/american-rescue-plan/build-back-better/finalists>; “Good Jobs Challenge Awardees,” Economic Development Administration (U.S. Department of Commerce, 2023), <https://www.eda.gov/funding/programs/american-rescue-plan/good-jobs-challenge/awardees>.

⁷⁷ “EDA Workforce Data Collection Instrument,” Economic Development Association (U.S. Department of Commerce, June 9, 2022), <https://omb.report/omb/0610-0109>.

4. Construction Workforce Plan

Applicants should incorporate the five aspects of facility plan identified in Section 3 into their construction workforce plan: workforce needs assessment; worker recruitment and retention; Good Jobs Principles approach; workforce training and wraparound services; and metrics and milestones. In addition, there are several unique considerations that apply in the context of the construction workforce.

Guidance from the NOFO. With respect to the construction and expansion of the facilities, each applicant will be required to submit a construction workforce plan that includes a detailed description of the steps that will be taken by the applicant and their construction partners to recruit, hire, train, and retain a diverse and skilled construction workforce. As part of this plan, applicants should describe their approach to worker recruitment and retention, including efforts to include women and other economically disadvantaged individuals in the construction industry; a strategy for creating good jobs; and engagement with community partners, such as labor unions, workforce development organizations, and others.

Applicants must also provide a detailed description of the steps that will be taken by the applicant and their construction partners to recruit, hire, train, and retain a diverse and skilled construction workforce, including any steps to expand employment opportunity for economically disadvantaged individuals. The plan should include the elements of a workforce plan discussed above: 1) Workforce needs assessment; 2) Worker recruitment and retention; 3) Good Jobs Principles approach; 4) Workforce training and wraparound services; and 5) Metrics and milestones.

Accordingly, the plan should include the identification of the number of jobs needed by craft/position type and where expected gaps may exist. The plan should also include identification of existing programs that successfully train diverse populations and that can be scaled appropriately before construction begins and as construction is ongoing, including high-quality apprenticeship readiness programs and Registered Apprenticeships. Applicants are strongly encouraged to provide wraparound services for construction workers to complete training and be retained on the construction site (such as adult care, transportation assistance, language support, tools, uniforms, appropriately sized safety gear and equipment, and services like mentorship that aim to help retain workers, etc.). The plan should also include specific details about the percentage of labor hours expected to be performed by registered apprentices.

Applicants should be aware that federal contractors and subcontractors must comply with certain equal employment opportunity requirements enforced by the Department of Labor's Office of Federal Contract Compliance Programs, including requirements related to recruitment, data collection and analysis, and hiring.⁷⁸ This section also describes specific actions that applicants may take to advance the objectives of the CHIPS program.

⁷⁸ The US Department of Labor's Office of Federal Contract Compliance Programs (OFCCP) holds those who do business with the federal government (contractors and subcontractors) responsible for complying with the legal

4.1 Project Labor Agreements

Project labor agreements (PLAs) are pre-hire collective bargaining agreements negotiated between one or more construction unions and one or more construction employers (contractors/project owners) that establish the terms and conditions of employment for a specific construction project.

Why Do PLAs Support CHIPS Goals? PLAs are beneficial for successful implementation of large, complex construction projects for which efficient and timely procurement is essential, such as those that will be funded by the CHIPS Act. These projects often have multiple employers at a single location and a lack of permanent workforce, which makes it difficult for contractors to predict labor costs when bidding on contracts and to ensure that a steady supply of labor exists on the contracts being performed. Additionally, a labor dispute involving one employer can delay the entire project. As a result, lack of coordination among various employers, or uncertainty about the employment terms and conditions of various groups of workers, can create friction and disputes in the absence of an agreed-upon resolution mechanism.

PLAs provide the structure and stability needed to reduce uncertainties for all parties connected to a large-scale construction project. These pre-hire agreements help secure the skilled and trained workforce required to complete a high-quality project on schedule. They also generally prevent labor disputes (and related delays) on projects by preventing strikes and lockouts. PLAs can also encourage increased veteran participation, apprentice utilization, local hiring, and the employment of women and people from underserved communities.

requirement to take affirmative action and not discriminate on the basis of race, color, sex, sexual orientation, gender identity, religion, national origin, disability, or status as a protected veteran. In addition, contractors and subcontractors are prohibited from discharging or otherwise discriminating against applicants or employees who inquire about, discuss or disclose their compensation or that of others, subject to certain limitations. See: "OFCCP at a Glance," Office of Federal Contract Compliance Programs (U.S. Department of Labor, August 1, 2019), https://www.dol.gov/sites/dolgov/files/ofccp/CAGuides/files/At-A-Glance-WEB_080119_CONTR508c.pdf.

Guidance from the NOFO. The Department strongly encourages the use of project labor agreements (PLA) in connection with construction projects. Applicants that commit to using best-practice project labor agreements will generally be likely to produce a construction workforce plan that meets the criteria in this NOFO. By contrast, applicants that do not commit to using a PLA will be required to submit workforce continuity plans and show that they have taken other measures to reduce the risk of delays in project delivery.

If an applicant proceeds without a PLA, the applicant must instead provide a project workforce continuity plan, detailing:

- Steps taken and to be taken to ensure the project has ready access to a sufficient supply of appropriately skilled and unskilled labor to ensure construction is completed in a competent manner throughout the life of the project, including a description of any required professional certifications and/or in-house training, Registered Apprenticeships or labor-management partnership training programs, and partnerships with entities like unions, community colleges, or community-based groups;
- Steps taken and to be taken to minimize risks of labor disputes and disruptions that would jeopardize timeliness and cost-effectiveness of the project;
- Steps taken and to be taken to avoid workplace illnesses, injuries, and fatalities, including descriptions of safety training, certification, and/or licensure requirements for all relevant workers (e.g., OSHA 10, OSHA 30, confined space, traffic control, or other training required of workers employed by contractors), the use of workplace safety committees, and whether the applicant commits to allowing employees to specify a worker or union representative to accompany any OSHA inspectors during any inspections of the construction project;
- Steps taken and to be taken to ensure that workers on the Project receive wages and benefits sufficient to secure an appropriately skilled workforce in the context of the local or regional labor market.

Best Practices for Project Labor Agreements. The existence of a project labor agreement indicates that a project will have the skilled labor and coordination needed to execute on a complex construction project. In addition, applicants should consider consulting several model PLAs as they negotiate with potential partners.⁷⁹ By crafting a PLA using best practices, applicants will have better capabilities to deliver projects on-time and at-cost.

⁷⁹ See for example: “The National Construction Agreement,” North American Contractors Association and North America’s Building Trades Unions (North America’s Building Trades Unions, May 2019), <https://nabtu.org/wp-content/uploads/2019/08/National-Construction-Agreement-Revised-05-01-19.pdf>, “City of Portland Community Benefits Agreement,” City of Portland (City of Portland, February 2020), <https://www.oregon.gov/odot/equity/Documents/City%20of%20Portland%20PLA%20Template.pdf>, “Project Labor Agreement Covering Design-Build New Construction, Renovation & Rehabilitation of City Owned Buildings and Structures 2021-2023,” City of New York (City of New York, November 15, 2021), https://www.nyc.gov/assets/mocs/downloads/pdf/2021_Vertical_DB_PLA%20_Agency_Solicitation_Version.pdf.

Applicants utilizing a PLA should therefore strongly consider how their PLA addresses each of the following best practices⁸⁰ for PLA agreements:

- **Timely hiring.** It is imperative that CHIPS projects proceed in a timely fashion and are uninterrupted by labor stoppages. Best-practice PLAs have language that commits unions to make available skilled workers quickly, such that worker absences do not lead to delay.
- **Recruitment of workers from outside the region.** Local unions have arrangements through their international parent organizations to allow for workers from other areas to work on a project when the local labor force is insufficient. With adequate notice, even large projects can recruit a labor force of diverse workers with established employment records from around the nation.
- **Dispute resolution procedures.** One of the major upsides of a PLA is that it can include mechanisms to limit disputes and quickly resolve any issues between management and labor. Best-practices PLAs have no-strike/no-lockout language, as well as other dispute resolution processes, such as (1) a “traditional” three step grievance/arbitration procedure; (2) a procedure for the settlement of jurisdictional disputes, and (3) an expedited arbitration procedure. Each of these processes has proven to be highly effective in preventing disruptions on worksites.
- **Harmonization of working hours.** CHIPS projects will need to coordinate workers of many different skillsets, specialties, and backgrounds. Coordination is an imperative for efficient delivery. By coordinating starting times, holidays, and other work rules, PLAs can improve efficiency, preventing inefficient use of time and/or excessive use of overtime.
- **Creation of labor/management committees.** Labor-management committees are a pivotal tool that helps oversee projects, set timelines, ensure that the tenets of a PLA are followed, and anticipate problems before they occur.
- **Local engagement.** The process of drafting a PLA should be inclusive and engage stakeholders throughout the community. Up front engagement helps ensure that the workers and community leaders who will implement the PLA can provide input, identify with the project, and feel a sense of ownership over its timely completion.
- **Health and safety provisions.** Project safety is a foundational priority for the Department. PLAs will often include provisions that emphasize the importance of health and safety, including, but not limited to, an explicit training program for both apprentice and journeymen related to the site; procedures to ensure a culture focused on health and safety; consistent tracking of workplace injuries and illnesses on the site and

⁸⁰ Matthew M. Bodah and Dale Belman, “Building Better: A Look at Best Practices for the Design of Project Labor Agreements,” Economic Policy Institute (Economic Policy Institute, August 12, 2010), https://www.epi.org/publication/building_better_a_look_at_best_practices_for_the_design_of_project_labor/.

evaluation of “near-miss” situations; and linking of health and safety to workers’ compensation to provide cost savings for effective health and safety programs.

- **Support for small and minority-owned businesses.** The Department will require each applicant to have a plan for supplier diversity. PLAs can support this goal is by supporting small and minority-owned businesses.
- **Access and oversight.** PLAs can create access and oversight committees, which often include the project owner, prime contractor, unions, and other relevant community stakeholders. These committees meet regularly to review and analyze workforce data for the purpose of monitoring progress on recruiting, retaining, and supporting underserved workers on jobsites. These committees can also develop dedicated outreach and representation strategies to address barriers and increase opportunities for workers from underserved communities.
- **Equitable training opportunities.** Many PLAs include Registered Apprenticeship programs, opportunities for pre-apprenticeships with direct pathways to Registered Apprenticeship programs, employment placement, and advancement for entry-level workers.
- **Tracking of diversity data.** Measuring performance and following through on commitments to community benefits and inclusion is critical. PLAs will often include tracking workforce metrics related to Registered Apprenticeship and apprenticeship readiness programs, including disaggregated data by race, ethnicity, and gender, to maintain visibility on whether initiatives to build and retain a diverse workforce are succeeding.

If an applicant proceeds without a PLA, the applicant must instead provide a project workforce continuity plan, as outlined in the NOFO.

4.2 Compliance with Federal Labor Laws

All CHIPS awardees will be subject to Federal labor and employment laws. Federal construction contractors and subcontractors also must comply with certain equal employment opportunity requirements regarding gender, race, ethnicity, disability, and veteran status. In addition, as part of their construction workforce plan, applicants must also provide a description of the steps that will be taken to ensure that all contractors and subcontractors on the construction project have and will continue to have a strong track record of compliance with all Federal labor laws, including but not limited to all relevant Davis-Bacon Act, Executive Order 11246, Occupational Safety and Health Act provisions, rules and regulations, and the steps that will be taken to prevent the misclassification of workers. Additional detail on applicable laws and agencies are available in the [section A.6.3](#) of this guide.

Guidance from the NOFO. As part of their construction workforce plan, applicants must also provide a description of the steps that will be taken to ensure that all contractors and subcontractors on the construction project have and will continue to have a strong track record of compliance with all Federal labor laws, including but not limited to all relevant Davis-Bacon Act, Executive Order 11246, Occupational Safety and Health Act provisions, rules and regulations, and the steps that will be taken to prevent the misclassification of workers. This description should also include the steps that will be taken to ensure that all workers have access to a safe working environment that is free of harassment, discrimination, and retaliation.

The Department supports strong labor standards to protect the individual worker and broader project workforce and create a safe job environment that benefits both worker and employer. Protecting workers can help promote talent retention, job competitiveness, and equity in worker treatment. Strategies applicants may consider include:

- **Appropriately Classify Jobs.** Job classification can depend on job responsibilities, scope, and complexity.⁸¹ Appropriately classifying different job types helps to ensure employees receive the protections and compensation they are owed for their work. Applicants can encourage subgrantees to submit job classifications for review.
- **Engage Labor Experts.** Federal DOL Regional Offices can provide additional support, resources, and guidance to teams across many labor and employment laws, such as fair labor laws, the Americans with Disabilities Act (ADA) and other civil rights laws, Occupational Safety and Health Administration (OSHA) requirements, and others that affect the semiconductor workforce.⁸² More detail on these programs are available in [section A.5](#) of this guide.
- **Provide Relevant Training.** For example, applicants may describe whether and how their project plan includes training for worksites on anti-harassment and other strategies (including third-party reporting procedures and robust anti-retaliation measures) to prevent and address hostility and harassment based on race, gender, ethnicity, or other factors protected under law.

⁸¹ “Job Quality Toolkit: Strategies and Actions to Help Small-to-Medium Sized Organizations Recruit and Retain a High-Performing Workforce,” U.S. Department of Commerce (U.S. Department of Commerce, August 2022) www.commerce.gov/sites/default/files/2022-08/Job-Quality-Toolkit.pdf; “Creating and Expanding a Diverse Broadband Workforce with Good Jobs and Career Pathways,” America Achieves and Rural Innovation Strategies (America Achieves, June 22, 2022), www.americaachieves.org/wp-content/uploads/2022/06/America-Achieves-Broadband-Workforce-Report-June-2022.pdf.

⁸² “State Labor Offices,” Wage and Hour Division (U.S. Department of Labor, n.d.), www.dol.gov/agencies/whd/state/contacts.

4.3 Women in Construction

Women make up 44 percent of the workforce, but only about 10 percent of the construction workforce. Increasing opportunities for women in the construction workforce will be paramount if applicants hope to attract and retain the skilled workforce needed on CHIPS projects. Applicants may consider the following strategies for recruitment, retention, and transparency to increase women's participation in construction.

Recruitment

- **Set clear hiring goals based on refined data** with rigorous compliance by all contractors and subcontractors.
- **Use Registered Apprenticeships.** Require or encourage that a certain percentage of the workforce or working hours come from Registered Apprenticeship Programs (the strongest path for new employees into the industry).
- **Support women-focused programs.** Identify, support, or launch community-specific Apprenticeship Readiness Programs that focus on women. Examples of such programs include Blue Collar Prep at Nontraditional Employment for Women (NEW), NEW at Night, Technical Opportunities Program at Chicago Women in Trades, and Pathways to Success Trades and Apprenticeship Career Class at Oregon Tradeswomen Inc.
- **Partner for success.** Establish formal partnerships with organizations that specialize in recruiting and training women. Many organizations already have a proven track record of preparing and placing individuals into high-quality jobs.

Retention and Support

- **Provide wraparound services.** Offer services including, but not limited to, transportation, child care (including nonstandard hour care), and well-fitting safety gear and tools that enable women to participate or enter the field.
- **Create a harassment-free workplace.** Set requirements to ensure that all workers have access to a safe environment that is free of harassment, discrimination, and retaliation. Strategies can include providing antibias training for employees of all levels; setting clear expectations about workplace conduct and anti-harassment policies, including clear consequences for violating policies; setting clear procedures for reporting misconduct in the workplace, including the identification of one or more individuals on site so that if women have problems, they have someone to go to; and using inclusive language and messaging.
- **Promote mentorship.** Create mentorship opportunities for longer-serving women on job sites to mentor new employees.
- **Promote women to leadership roles.** Create promotional pathways for women to move into steward and foreman roles.
- **Ensure restroom access.** Require every job site to have both men's and women's restrooms and provide adequate time to use facilities when needed.

Accountability and Transparency

- **Measure for success.** Enforce workforce goals at all levels, either by supervisory staff or outside contractors.
- **Be transparent.** Publish and frequently update workforce data to ensure all demographic goals are being met.

- **Track and review performance.** Convene regular meetings with all relevant stakeholders to review and respond to the data in real time.

5. Child Care Plan

To fully staff construction sites and fabs, and to achieve the CHIPS Act economic and national security objectives, employers and applicants must recruit, train, and hire a skilled workforce, including by looking to new sources of talent.

Labor force participation continues to languish below pre-pandemic rates.⁸³ Delivering on CHIPS goals requires implementing new and creative strategies for attracting and retaining a skilled workforce.

One of the biggest barriers to workforce participation is access to child care. Half of all workers and nearly 60 percent of parents cite lack of childcare as their reason for leaving the workforce.⁸⁴ The 2018-2019 National Survey of Children's Health reported that the parents of two million children under the age of 5 had to quit a job, not take a job, or greatly change their job because of problems with child care.⁸⁵ Over half of working parents report difficulties related to child care, and an inability to find child care is one of the primary factors keeping women out of the workforce.⁸⁶ In fact, Federal Reserve data shows that over the past two years women with young children have experienced large and persistent declines in labor force participation.⁸⁷

Policies that expand access to child care can boost both parental participation and productivity in the workplace, including by allowing working parents to obtain additional education or job training and increasing the likelihood that they will work full time.⁸⁸ Child care sector benefits also promote recruitment, retention, and productivity.

The Department is focused on ensuring that construction sites and manufacturing facilities have the workforce they need to achieve the goals of the CHIPS Act, and that everyone, including women, can participate and thrive in the U.S. semiconductor economy. Facilitating access to child care is an important step toward achieving these goals.

⁸³ "Charts Related to the Latest 'The Employment Situation' News Release." U.S. Bureau of Labor Statistics, <https://www.bls.gov/charts/employment-situation/civilian-labor-force-participation-rate.htm>. In February 2023, the labor force participation rate was 62.5 percent compared to 63.3 percent in February 2020.

⁸⁴ "Data Deep Dive: A Decline of Women in the Workforce", U.S. Chamber of Commerce Foundation (April 27, 2022), <https://www.uschamber.com/workforce/data-deep-dive-a-decline-of-women-in-the-workforce>.

⁸⁵ "2019 National Survey of Children's Health: Indicator 6.17," Data Resource Center for Child & Adolescent Health (Child and Adolescent Health Measurement Initiative, 2019), <https://nschdata.org/browse/survey/results?q=8354>.

⁸⁶ Katherine Schaeffer, "Working moms in the U.S. have faced challenges on multiple fronts during the pandemic," Pew Research Center (May 6, 2022), <https://www.pewresearch.org/fact-tank/2022/05/06/working-moms-in-the-u-s-have-faced-challenges-on-multiple-fronts-during-the-pandemic/>; Leila Schochet, "The Child Care Crisis Is Keeping Women Out of the Workforce," Center for American Progress (March 28, 2019), <https://www.americanprogress.org/article/child-care-crisis-keeping-women-workforce/>.

⁸⁷ Katherine Lim and Mike Zabeck, "Women of color and women with children disproportionately left the labor force during the COVID-19 pandemic," (February 28, 2022), <https://www.minneapolisfed.org/article/2022/women-of-color-and-women-with-children-disproportionately-left-the-labor-force-during-the-covid-19-pandemic>.

⁸⁸ Elizabeth E. Davis, et al., "Do Child Care Subsidies Increase Employment Among Low-Income Parents?" J. Fam. Econ. Iss 39, 662-682 (2018), <https://doi.org/10.1007/s10834-018-9582-7>; Chris M. Herbst and Erdal Tekin, "Do child care subsidies influence single mothers' decision to invest in human capital?," 30 Economics of Education Review 5, 901-912 (October 2011), <https://doi.org/10.1016/j.econedurev.2011.03.006>.

Guidance from the NOFO. Child care is critical to expanding employment opportunity for economically disadvantaged individuals, including economically disadvantaged women. The Department requires that any applicant requesting CHIPS Direct Funding over \$150 million provide a plan for access to child care for facility and construction workers, e.g., through on- or near-site child care, pre-arranged agreements with existing child care providers, child care subsidies, or other similar measures.

To meet families' needs and thus expand employment opportunity, child care should be:

- Affordable: costs are within reach for low- and medium-income households
- Accessible: at a convenient location with hours that meet workers' needs
- Reliable: granting workers confidence that they will not need to miss work for unexpected child care issues
- High-Quality: providing a safe and healthy environment that families can trust and nurtures the healthy growth and development of children

Projects that do not request CHIPS Direct Funding meeting the \$150 million threshold are still strongly encouraged to provide access to child care for facility and construction workers to the greatest extent feasible.

The Department recognizes that there will not be a one-size-fits-all solution, as child care needs will vary across communities and employers. The Department expects applicants to devise solutions that are responsive to their workers' needs, such as access at extended hours, and regional market dynamics. In addition, the Department encourages applicants to work with community stakeholders, including state and local governments and local groups with expertise administering child care, to create effective solutions.

Applicants may also consider whether there are opportunities to leverage facilities or arrangements that would aid both facility and construction workers. However, applicants may choose to address facility and construction workers separately. Applicants that are subject to this requirement should therefore work with their contractors to determine what strategies they will use to ensure access to child care, including access at extended hours when necessary, and then describe those strategies as a separate element of their facility and construction workforce plans

5.1 Core Child Care Principles

To meet families' needs and expand employment opportunity child care should be accessible, affordable, high-quality, and reliable. Child care needs will vary across regions and employers, and the Department is not looking for a one-size-fits-all approach. Employers should consider partnering with child care organizations, providers, and families to assess current child care capacity and gaps in the community (e.g., availability of services, workforce needs, family preferences) to ensure that child care plans can deliver care that is accessible, affordable, high-quality, and reliable.

Accessibility. The first gateway that workers often face in the market is finding accessible care—in particular for infants and toddlers. Due to historic under-investment in child care, there

is a serious shortage of workers and programs, with many programs maintaining long waitlists and parents left hoping a spot may become available in a setting that fits their needs.

In addition to capacity, the location and hours of operation also often influence whether care is accessible.

Survey research shows that parents are either unable or unwilling to transport their children to far-off locations to increase their employment opportunities. Though on-site care is often convenient for workers, sometimes off-site care better meets workers' needs, such as when families seek care near their home. In addition, many child care centers operate on schedules tailored to traditional working hours which may not support individuals who work non-standard hours. Moreover, intense competition for child care slots means that even when such care is provided, workers might have trouble reserving space for their child. Accessible care provides services at a convenient location with hours that meet workers' needs.

Affordability. The price of care is also an acute barrier in many regions of the United States. The median price of child care for just one child in some regions represents nearly 20 percent of median family income, and an even greater percent of family income for lower-income families.⁸⁹ In the United States, the price of child care increased 210 percent between 1990 and 2019, faster than the increase in consumer spending overall (74 percent) and faster than the median family income (143 percent).⁹⁰ Recent data also demonstrate that a 10 percent increase in median childcare prices was associated with 1 percentage-point lower county-level maternal employment rates.⁹¹

And while child care prices vary substantially across the country, data shows that even in lower-priced areas, prices are still too high for many families to afford.⁹² Middle- and low-income households are acutely at risk when the price of care rises, particularly for infants and toddlers for whom caregiver-child ratios need to be lower to meet children's needs.

The Department is not requiring or expecting applicants to provide free care. To successfully attract and retain workers, applicants should strongly consider defraying the price of care such that it is within reach for low- and medium-income households. In practice, the affordability of care may change based on circumstances outside the control of a provider – including changes in family composition. Thus, while fixed affordability metrics (e.g., a fixed share of family

⁸⁹ "National Database of Childcare Prices," Women's Bureau (U.S. Department of Labor, n.d.), <https://www.dol.gov/agencies/wb/topics/childcare>.

⁹⁰ "The Cost of Living in America: Helping Families Move Ahead," Council of Economic Advisors & Office of Management and Budget Issue Brief (The White House, August 2021), <https://www.whitehouse.gov/wp-content/uploads/2021/08/Costs-Brief.pdf>. Overall consumer spending is measured by the Personal Consumption Expenditures price index which reflects changes in the prices of goods and services purchased by U.S. consumers. See: "Personal Consumption Expenditures Price Index," Bureau of Economic Analysis (Bureau of Economic Analysis, February 24, 2023), <https://www.bea.gov/data/personal-consumption-expenditures-price-index>.

⁹¹ Liana Christin Landivar, Nikki L. Graf, and Giorleny Altamirano Rayo, "Childcare Prices in Local Areas, U.S." Women's Bureau (U.S. Department of Labor, January 2023), https://www.dol.gov/sites/dolgov/files/WB/NDCP/WB_IssueBrief-NDCP-final.pdf.

⁹² Christin Landivar, "New Childcare Data Shows Prices Are Untenable for Families," Women's Bureau (U.S. Department of Labor, January 24, 2023), https://blog.dol.gov/2023/01/24/new-childcare-data-shows-prices-are-untenable-for-families/?_ga=2.262442764.102264152.1675172343-255207837.1675172343.

income⁹³) may serve as a guidepost, applicants may consider taking a holistic view of how to defray the price of care for its workers.

Quality. Families need child care that is safe, stable, and high-quality to feel comfortable placing their children in another person's care. High-quality child care has immense benefits to children, leading to improved cognitive and health outcomes over time.⁹⁴

As a general matter, high-quality child care providers will employ staff who are well-compensated and appropriately resourced to do the job. Well-compensated child care workers tend to stay on the job longer, gain skills and expertise, and can give children the focus and attention they need. For that reason, high-quality care is associated with better pay for caregivers.⁹⁵

In addition, high-quality programs generally support and nurture children's overall growth and development, including their social, emotional, intellectual, and physical development.⁹⁶ Common metrics of quality include provider and staff education and training, health and safety records, appropriate group sizes and ratios of staff to children that allow adults to give children sufficient attention, and facilitate meaningful adult-to-child interactions. Licensure and accreditation are another way to ensure that care is safe and high-quality. High-quality child care can be found in a variety of settings, including child care centers, as well as family child care homes, which may be license exempt. For additional resources on care quality, applicants may (where applicable) consult their state's licensing regulations and care quality rating systems, Head Start quality standards, or other tools.⁹⁷

Reliability. Even when families have access to child care, disruptions in care can place both children and families in a bind. An estimated \$3 billion in revenue is lost annually due to employee absenteeism as the result of child care breakdowns.⁹⁸ Beyond that, due to lapses in after school care, parents can lose up to eight days of work and businesses can lose upwards of \$300 billion a year.⁹⁹ Such problems affect a diverse and large group of families. A 2023 study

⁹³ The U.S. Department of Health and Human Services (HHS) has previously communicated to states accepting federal child care subsidy funding that low-income families receiving subsidies should spend no more than 7 percent of family income on child care payments.

⁹⁴ Elaine A. Donoghue, "Quality Early Education and Child Care From Birth to Kindergarten," *American Academy of Pediatrics* 140, no. 2 (2017): 1-6, <https://doi.org/10.1542/peds.2017-1488>; Andres S. Bustamante et al., "High-Quality Early Child Care And Education: The Gift That Lasts A Lifetime," Brookings (Brookings, November 4, 2021), <https://www.brookings.edu/blog/education-plus-development/2021/11/04/high-quality-early-child-care-and-education-the-gift-that-lasts-a-lifetime/>.

⁹⁵ Asha Banerjee, Elise Gould, and Marokey Sawo, "Setting Higher Wages For Child Care And Home Health Care Workers Is Long Overdue," Economic Policy Institute (Economic Policy Institute, November 18, 2021), <https://www.epi.org/publication/higher-wages-for-child-care-and-home-health-care-workers/>.

⁹⁶ "Child Care Quality Ratings," Childcare.gov (Administration for Children & Families and Office of Child Care, 2023), <https://childcare.gov/consumer-education/child-care-quality-ratings>.

⁹⁷ Ibid.

⁹⁸ "The Bedrock of American Business: High-Quality Early Childhood Education, U.S. Chamber of Commerce Foundation," The Business Case (U.S. Chamber of Commerce Foundation, February 9, 2021), <https://www.uschamberfoundation.org/early-childhood-education/the-business-case>.

⁹⁹ Ibid.

found that one in four parents of infants and young children reported being fired for work interruptions due to child care breakdowns.¹⁰⁰

What it means to provide reliable care may vary across employers and regions. However, there are several models of reliable care benefits that applicants may consider. For example, some employers work to ensure that, to the extent possible, employees have reliable schedules that enable them to arrange care in advance. Other employers provide access to back-up care (e.g., emergency coverage through center or home-based care) or alternative arrangements (e.g., compensation for a family member to stay home) if something goes wrong.¹⁰¹ Employers may also consider whether they support a multitude of care options such that employees can arrange care in a pinch or in crisis.

5.2 How Companies Provide Access to Child Care

As employers increasingly realize the importance of child care to employee retention and productivity, several different models of employer-provided care have emerged. This section reviews several of the primary models that employers already use to provide their workers with care. Mention of these models already used by employers does not convey endorsement or approval by the Department of Commerce of the entity or their programs or resources. All examples provided are for illustrative, non-exhaustive purposes only. The Department of Commerce does not guarantee the accuracy or completeness of the information contained herein.

The Department recognizes that these models (and the associated benefits) may not work in every scenario. In some cases, the models may be used in combination. In fact, many companies have successfully used mixed delivery models to provide benefits that are tailored to their workers' diverse needs. Similarly, case studies in this section are not panaceas, but are included to illustrate potential strategies that applicants for CHIPS funding may pursue. The four primary models are: on-site care, operated by the employer; on-site care, contractor operated; off-site care, cash assistance; and off-site care, provider sponsorship.

On-Site Care: Operated by the Employer. Building an on-site child care center and hiring staff to operate it has several advantages. First, it helps employers ensure that their employees receive high-quality care, that staff are well paid, and that programs reflect worker needs and priorities. In addition, when a company provides space and owns the profits and/or losses from a care center (including any management and staffing fees), it might enable the employer to provide care at a lower cost to employees by charging only what is necessary to operate the center. Employers may also be eligible for certain tax credits.¹⁰² Finally, such on-site care is

¹⁰⁰ “\$122 Billion: The Growing Annual Cost of the Infant-Toddler Child Care Crisis,” ReadyNation (Council for a Strong America, 2023), <https://www.strongnation.org/articles/2038-122-billion-the-growing-annual-cost-of-the-infant-toddler-child-care-crisis>.

¹⁰¹ “Employer Roadmap: Childcare Solutions for Working Parents,” U.S. Chamber of Commerce Foundation (U.S. Chamber of Commerce Foundation, 2022), https://www.uschamberfoundation.org/sites/default/files/ECE%20Employer%20Roadmap_March%202022.pdf.

¹⁰² “Credit for Employer-Provided Child Care Facilities and Service: Form 8882” Internal Revenue Service (Department of the Treasury, December 2017), <https://www.irs.gov/pub/irs-pdf/f8882.pdf>.

often (though not always) convenient to employees.¹⁰³ Companies that choose to provide on-site care also often offer slots for other children and families in the community, both to ensure the center can operate at full enrollment and to support community economic development.

However, on-site, employer-operated care requires advance planning and investment. On-site care requires new building space or remodeling/repurposing existing space. In some cases, the cost of standing up a new facility may be significant, and the U.S. Chamber of Commerce Foundation estimates that it can take one and a half years to launch a new on-site program.¹⁰⁴ Beyond that, operating a child care facility requires licensure, insurance, and other liability protections. On-site care also requires employers to ensure they have sufficient demand such that their facility would be viable. That is not always a guarantee, especially for smaller employers or those who cannot open their facility to the public if demand is not there. Some families may prefer care with different characteristics (e.g., family child care homes) or in a different location.

These operational hurdles aside, several companies have had major success with providing on-site child care. Collins Aerospace, for example, partnered with other local businesses and grassroots organizations to stand up a near-site child care center.¹⁰⁵ The center is open to all members of the community, with Collins employees receiving preference, and now operates with an enrollment of over 300 children. Similarly, Patagonia has offered on-site childcare since 1983. In addition to providing on-site child care in Reno, NV and Ventura, CA, Patagonia offers child care stipends for parents who are not based in those areas. This model shows that on-site, employer-provided care can be both an important tool for worker well-being and improve business performance.

On-Site Care: Contractor Operated. With fully outsourced care, a company provides space (on-site or nearby) and/or shuttle service to site, and an external vendor provides care and operates the child care center. In many respects, relying on an external vendor can lower administrative overhead for the employer while still capturing the benefits of on-site care. In addition, working with an experienced partner can help ensure access to high-quality care and a cadre of experienced child care professionals. And as with employer-operated care, contractor-operated care can accommodate drop-offs in demand by opening spaces for the public when there is unused capacity.

In some cases, however, contracting out child care may increase prices for employees and limit employer flexibility, as care providers may charge a premium beyond the cost of care (though the employer can still subsidize prices for employees). Beyond that, relying on a contractor may result in additional difficulties if an employer wants to change operating hours or tailor its offerings to worker needs.

¹⁰³ See, e.g., Rebecca A Snyder et al., "The Case for On-Site Child Care in Residency Training and Afterward," *Journal of Graduate Medical Education* 5, no. 3 (2013): 365-367, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3771163/>.

¹⁰⁴ "Employer Roadmap: Childcare Solutions for Working Parents," U.S. Chamber of Commerce Foundation (U.S. Chamber of Commerce Foundation, 2022), https://www.uschamberfoundation.org/sites/default/files/ECE%20Employer%20Roadmap_March%202022.pdf.

¹⁰⁵ "Starting Small and Growing to Meet Childcare Demand," Talent Forward (U.S. Chamber of Commerce Foundation, 2023), <https://www.forwardontalent.org/stories/collins-aerospace/>.

Overall, the on-site, contractor-operated model has been adopted successfully by several companies. Toyota, for example, provides round-the-clock on-site child care at its Kentucky and Indiana manufacturing sites.¹⁰⁶ These on-site centers cater to employees' needs for extended hours. In Kentucky, the company was also able to work with the local school district to provide children in the facility transit access to schools. Likewise, Marriott has an on-site care facility at its headquarters, and partners with off-site providers, including resource and referral agencies, to ensure access to care for its employees at other locations.¹⁰⁷ As noted by the Chamber of Commerce Foundation, there are many case studies and examples employers can draw from in adopting an on-site, contractor-operated model.¹⁰⁸

Off-Site Care: Cash Assistance (e.g., vouchers/subsidies). Under this model, the employer provides bonuses, vouchers, or subsidies to help employees meet costs of child care with existing care providers. The cash assistance model has many upsides. For the employer, it comes with relatively low overhead. For employees, vouchers provide maximal flexibility in choosing which care facility they might want to use (assuming there is capacity, and the amount of the subsidy is sufficient to make the child care option affordable for the family). This may be particularly valuable when workers live in neighborhoods far from their worksite, as vouchers will enable those employees to find care that is close to home. Vouchers also can enable compensation for a wide range of settings.¹⁰⁹ And employers who provide vouchers will often partner with child care resource and referral agencies to offer “child care navigation” services to employees that help them identify opportunities to use the benefit.

For those applicants considering using vouchers in their child care plans, vouchers (absent additional services) may only address affordability issues. For example, in areas of limited child care capacity, vouchers may drive up local prices, especially if they increase demand for child care without driving an increase in supply. As a result, large scale projects may need to pair vouchers with steps that directly influence the supply of child care. Of available options, vouchers may be less attractive (as a standalone offering) than capacity-expanding options that also include affordability support.

Several employers have already deployed voucher programs to support their employees in accessing care. For instance, Bank of America provides child care subsidies of up to \$275 a month, per eligible child, and makes the benefit available to full and part-time employees making less than \$100,000 per year.¹¹⁰ Bank of America also provides resources to help employees find child care that meets their needs through referral, research, and information resources. Other employers may want to partner with existing child care resource and referral agencies to provide this support.

¹⁰⁶ NAM News Room, “The Right Thing to Do’: Toyota Provides Overnight Child Care, National Association of Manufacturers,” National Association of Manufacturers (National Association of Manufacturers, June 9, 2022), <https://www.nam.org/the-right-thing-to-do-toyota-provides-overnight-child-care-17824/?stream=workforce>.

¹⁰⁷ CHIPS Program Office Interviews (Jan. 2023).

¹⁰⁸ “Employer Roadmap: Childcare Solutions for Working Parents,” U.S. Chamber of Commerce Foundation (U.S. Chamber of Commerce Foundation, 2022), https://www.uschamberfoundation.org/sites/default/files/ECE%20Employer%20Roadmap_March%202022.pdf.

¹⁰⁹ See below (Section 5.3) for further discussion of different provider options.

¹¹⁰ CHIPS Program Office Interviews (Jan. 2023).

Off-Site Care: Provider Sponsorship. Employers will sometimes sponsor off-site care providers to increase capacity and improve options available to their workers. Sponsorship can take several forms. In some cases, a company will give a lump sum donation to enable increased capacity or operating hours at an existing center. In others, a company may pay upfront for slots for shift workers to guarantee capacity, and then allow its employees to access such care at a discount. Some of the time, these arrangements will involve a community center open to all families in the area.

The benefits of provider sponsorship can be significant. For one, sponsorship can directly increase the supply of local care, which can help lessen upward price pressures in the community. Likewise, sponsorship can often attract multiple partners or community stakeholders (e.g., home-based, non-profit, or faith-based providers) since the benefits are shared broadly among the community, rather than just by the employer. Scaling capacity-building efforts requires strategic collaboration with state and local communities, and when employers take part in such efforts, they may attract additional capital for child care. Further, this approach leverages and builds on the supply of care in the community, avoiding potential unintended disruptions of the existing child care market that could lead to reduced access for other families in the community.

In addition, provider sponsorship allows employers to alter or expand caregiver services without the overhead of starting a facility. If workers need care at extended hours, sponsorship provides an opportunity to help generate such care without the administrative overhead of launching its own facility. And in determining the provider payment rate under a sponsorship model, employers can work with providers to understand the full cost of providing high-quality care and ensure that the employer contributes the appropriate proportion of that cost.

One example of an employer's use of a sponsorship model is Dr. Bronner's, a soap manufacturer in California.¹¹¹ After realizing many of its manufacturing and shift workers had difficulties securing child care, Dr. Bronner's investigated several options for providing care to its workers. Ultimately, Dr. Bronner's partnered with an online care platform so that workers could arrange care that was close to home and met their needs for extended-hours care. Non-traditional care providers, as well as in-home providers, were eligible through the platform. Dr. Bronner's also subsidized access to care, paying up to \$7,500 per family per year. Companies across retail, health care, and other industries have similarly worked with startups or online platforms to match workers with existing facilities.

Another example of provider sponsorship is Wisconsin's Partner Up! Program, which allows businesses to buy slots for their employees at existing regulated child care providers.¹¹² By reserving slots up front, Partner Up's sponsorship model helps improve caregivers' financial viability, thereby increasing neighborhood supply and ensuring that caregivers are appropriately compensated. The program also simultaneously enables employers to deliver accessible and

¹¹¹ Aaron Merchen, "Reimagining Childcare Through Innovative Partnerships," Center for Education and Workforce (U.S. Chamber of Commerce Foundation, August 30, 2021), <https://www.uschamberfoundation.org/blog/post/reimagining-childcare-through-innovative-partnerships>.

¹¹² CHIPS Program Office Interviews (Dec. 2022).

convenient care without an on-site facility. Partner Up's sponsorship arrangement has thus helped hundreds of businesses pre-arrange care with local providers.¹¹³

That said, provider sponsorship may have drawbacks, particularly if a sponsored facility is not convenient for workers. It also requires thoughtful research and partnership to ensure the care itself is high-quality. Sourcing and reimbursement models—where an employer reserves slots for workers but does not encourage the facility to increase capacity—can be useful when there is an ample supply of child care. When child care is scarce, reserving seats for employees should be paired with other strategies to meet worker needs.

5.3 Special Considerations for Construction Workers

To keep up with demand over the coming years, the construction industry must work to recruit, train, and retain a new generation of workers. Access to reliable, affordable, and quality child care is often an overlooked barrier to successful employment. Surveys of construction workers show that among women with children under 18 who seriously considered leaving the construction industry, more than two-thirds mention difficulties finding child care as a key factor.¹¹⁴

Although child care is a factor that affects industries nationwide, there are unique challenges facing the construction industry.

Hours of Care. Construction jobs often start early in the morning, and the commute time can be significant. Many parents in construction need drop off times to be available before many child care centers open and pickup times that extend past typical hours.

Affordability. The price of child care can be burdensome for construction workers, especially for apprentices and trainees.¹¹⁵ A recent survey of construction apprentices found that 45 percent of mothers and 26 percent of fathers identified the cost of child care to be a problem.¹¹⁶

Location. Finding high-quality, reliable child care is difficult for parents regardless of the industry. But the in-person, on-site nature of construction work creates significant challenges for workers with child care responsibilities. That is especially true for construction sites that are sometimes far from where workers live.

¹¹³ "Partner Up! Grant Program," Wisconsin Department of Children and Families (Wisconsin.gov, 2023), <https://dcf.wisconsin.gov/childcare/projectgrowth/partner-up>.

¹¹⁴ Ariane Hegewisch and Eve Mefferd, "A Future Worth Building: What Tradeswomen Say about the Change They Need in the Construction Industry," Institute for Women's Policy Research (Institute for Women's Policy Research, 2021), https://iwpr.org/wp-content/uploads/2022/02/A-Future-Worth-Building_What-Tradeswomen-Say_FINAL.pdf.

¹¹⁵ "Highest Paying Jobs Without A Degree," U.S. News & World Report: Careers (U.S. News & World Report L.P., 2023), <https://money.usnews.com/careers/best-jobs/rankings/the-100-best-jobs>.

¹¹⁶ "Child Care Supports For The Construction Trades: Building and Sustaining Diversity in Oregon," Institute for Women's Policy Research (Institute for Women's Policy Research, 2020), <https://policygroupontradeswomen.org/wp-content/uploads/2021/12/IWPR-Oregon-Child-Care-in-Construction-2020-Final.pdf>.

Potential Interventions

The Department is committed to working with applicants to develop or identify innovative mechanisms to provide child care to construction workers at scale. Applicants may consider the following examples of strategies that other employers have used:

For off-site care, use demand guarantees for providers to ensure access at the proper times and locations. One reason child care providers may not operate in a child care desert or have capacity at extended hours is lack of demand visibility. Applicants can conduct an assessment of what their workforce child care needs are and the existing supply available. If an applicant finds that their local child care market does not provide needed extended hours care or accessible capacity, they may consider taking steps using their purchasing power to ensure care giver supply. Demand guarantees (i.e., when companies guarantee a certain level of use or financial backing to centers or home-based providers) can help address this problem. By prearranging such care with providers, employers can help de-risk extended hours care or encourage expansion of capacity in a market that otherwise would not be economically viable.

Consider opportunities to leverage long-term infrastructure for facility workers.

Companies may consider ways to create programs that support both construction and facility workers. For example, for facilities that plan to offer on-site care, employers may consider whether there is an opportunity to build a child care facility in the first phase of construction so that construction workers can benefit, too. Similarly, if an applicant plans to sponsor an off-site facility or provide demand guarantees with off-site providers, they might investigate whether there are opportunities to work with their construction partner to build capacity with that provider on a more expedient timeline.

Partner with a range of providers (e.g., family, smaller providers) to meet worker needs.

Given construction workers' non-standard work hours, employers may struggle to find child care programs that provide accessible and affordable options. Some organizations facing this problem have investigated whether there are opportunities to work with a range of care providers—including faith-based organizations and home-based facilities—to find child care for their workers' families.¹¹⁷ Home-based providers often have more flexible hours and locations, which can be useful when working with populations that need non-standard hour care. These providers may also be responsive to unique needs of the workforce, such as bilingual care, culturally appropriate services, or services targeted towards children with special needs.

Because home-based providers are more dispersed and serve fewer children per facility, employers may find it difficult to partner with them to provide the scale of services their employees need. Applicants may consider working with intermediaries—such as child care resource and referral agencies, associations for the education of young children, community development financial institutions, local dedicated funds for children and youth, licensed family child care networks, and shared service alliances, and private care intermediaries—to help connect local child care providers with workers who may have care needs.¹¹⁸

¹¹⁷ "Home-Based Child Care Fact Sheet," Home Grown (Homegrown Childcare, December 14, 2020), https://homegrownchildcare.org/wp-content/uploads/2020/12/HomeGrown_Child-Care-Fact-Sheet_final.pdf.

¹¹⁸ Resources for particular states are available at: "See Your State's Resources," ChildCare.gov (U.S. Administration for Children & Families, 2023), <https://childcare.gov/state-resources-home>.

See [Section A.4](#) of this Guide for case studies on child care for construction workers.

5.4 Partners and Other Resources Available

As noted above, the Department recognizes that creating an access to child care plan can be complicated. The Department is committed to working closely with applicants to navigate this challenge.

An important first step applicants may consider is to survey their workforce and community to determine local needs. Such a plan may reflect whether the community suffers from demand constraints (price) and/or supply constraints (capacity); areas for improvement, including drawing on existing child care community needs assessments; and what workers say they need, either through surveys, discussions with worker representatives (e.g., unions), or other engagement.

Companies that have performed such surveys or listening sessions have used that approach to inform their ultimate benefits package.¹¹⁹ Similarly, applicants can benefit from a community perspective on what initiatives and partners might be eager to support expanded access to child care. Child Care Resource and Referral Agencies can be helpful partners to consult in many communities to understand the existing child care supply and gaps in the community.¹²⁰ In all cases, understanding local context will be pivotal.

In addition, applicants may consider partnering with state and local governments and taking advantage of other federal resources available for employer-provided child care. To encourage businesses to provide child care to their employees, the Federal government offers companies a tax credit to help cover some of the associated costs. The Employer-Provided Child Care Credit, under the Internal Revenue Code Section 45F, offers employers a tax credit of up to 25 percent of qualified child care expenditures and 10 percent of qualified child care resource and referral expenditures, both detailed below. The credit is capped at \$150,000 and can offset initial investments in employer-provided care. Dependent Care Flexible Spending Accounts (DCFSA) might also be a relevant tool for employers to explore.¹²¹

Similarly, many states and localities have launched ambitious programs to support access to child care that applicants may collaborate with or leverage. State assistance can be valuable on at least three fronts, including real estate (and site selection for facilities), financing (including state funding for programs), and partnerships (including obtaining relevant licenses). Many employers have already begun partnering with their state and local governments to get their employees access to care. For instance, Colorado and Iowa both have statewide grant programs that support employers who construct, remodel, renovate, or retrofit on-site or near-

¹¹⁹ Nadine El-Bawab, “Employers Offer Stipends For Babysitting And Tutoring To Sweeten Child-Care Benefits And Win Over Workers,” The Path Forward (CNBC, July 9, 2021), <https://www.cnbc.com/2021/07/09/employers-sweeten-child-care-benefits-to-win-over-workers-.html>.

¹²⁰ “Child Care Resource and Referral,” Child Care Aware® of America (Child Care Aware® of America, 2023), <https://www.childcareaware.org/about/child-care-resource-referral/>.

¹²¹ Jenna Shrove, “Employer Guide to Childcare Assistance and Tax Credits,” U.S. Chamber of Commerce (U.S. Chamber of Commerce, April 28, 2022), <https://www.uschamber.com/workforce/employer-guide-to-childcare-assistance-and-tax-credits>.

site child care facilities.¹²² These programs are varied and extensive; as part of an applicant's engagement process for receiving state and local incentives, applicants may ask about opportunities to jumpstart their child care efforts. Applicants may also consider whether there are opportunities to work with their state and local governments to streamline licensing processes or reduce start-up costs and constraints on child care capacity without sacrificing safety or quality.¹²³

Finally, as discussed in the previous section, there are a wide variety of community partners that are willing and able to support employers in finding care for their employees' children. The U.S. Chamber of Commerce foundation, for example, offers numerous resources and case studies to employers seeking to provide affordable, quality child care for working parents.¹²⁴ Child care resource and referral agencies can also partner with employers to offer "child care navigation" services to employees as an additional benefit.

¹²² Ann Schimke, "At Hospitals, Food Halls, And Ski Resorts, Colorado Effort Helps Employers Create On-Site Child Care," Chalkbeat Colorado (Chalkbeat, February 2, 2022), <https://co.chalkbeat.org/2022/2/1/22913443/colorado-employer-provided-child-care>; "Child Care Grants," Future Ready Iowa (Iowa.gov, 2023), <https://www.futurereadyiowa.gov/child-care-grants#:~:text=The%20Child%20Care%20Business%20Incentive,a%20benefit%20to%20their%20employees>.

¹²³ Hailey Gibbs, "Increasing America's Child Care Supply," Center for American Progress (Aug 23, 2022), <https://www.americanprogress.org/article/increasing-americas-child-care-supply/>

¹²⁴ "Employer Roadmap: Childcare Solutions for Working Parents," U.S. Chamber of Commerce Foundation (U.S. Chamber of Commerce Foundation, 2022), https://www.uschamberfoundation.org/sites/default/files/ECE%20Employer%20Roadmap_March%202022.pdf. For additional tools that may be useful in accessing care, see Childcare.gov (Administration for Children & Families and Office of Child Care, 2023), <https://childcare.gov/>.

6. Submitting a Successful Workforce Development Plan

The Department recognizes that the development and implementation of workforce plans are ambitious, long-term efforts that will support the success of the CHIPS Incentives Program. Guidance for both the Pre-Application (optional) and Full Application submissions are included in this section; there is no workforce development component for the Statement of Interest submission. This section also includes recommendations on how applicants can further the development of the semiconductor workforce and education ecosystem over time.

The workforce development plan must demonstrate appropriate investments and commitments to create good jobs and recruit, train, screen, hire, retain, and upskill a diverse workforce sufficient to meet operating needs.

As described in [section 2](#) of this Guide, the Department strongly encourages each applicant to engage in a sectoral partnership focused on the labor market region where the semiconductor manufacturing will take place. Sectoral partnerships will play an integral role in the development and implementation of high-quality workforce development strategies.

Because meeting workforce needs will require ongoing collaboration and coordination across the sector, the Department expects to engage with recipients to support workforce efforts after awards are made.¹²⁵

More guidance on workforce development planning will be posted on chips.gov/workforce-development and communicated to applicants it becomes available.

Guidance from the NOFO. Each applicant must document their expected workforce needs for each facility and provide a strategy to meet such needs in a single workforce development plan. Applicants must also produce a workforce plan for their construction workforce. Applicants are required to identify the overall financial resources that will be committed to these efforts by the applicant and other parties across the workforce system. Applicants should also explain what those resources will be used for, though the Department understands that the level of detail may vary depending on the stage of the development of a sector partnership or other workforce development planning. The plans for construction workers and facility workers should not exceed 30 pages in total, excluding any attachments.

¹²⁵ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication*, 20-21. <https://www.grants.gov/web/grants/view-opportunity.html?oppld=346349>.

6.1 Workforce Development Planning Guiding Questions

The following sets of questions are intended to help applicants articulate their workforce needs in the pre-application and final application submissions while meeting the guidelines outlined in the February 2023 NOFO. Applicants are not required to submit answers to all these questions, rather the questions should be used to guide applicants' workforce development planning activities.

Developing and sustaining sectoral partnerships

- What efforts have you made to identify employers in your industry and adjacent industries and other organizations to develop a sectoral partnership, including a backbone organization?
- What structure, norms, and supports are in place to build and sustain the sectoral partnership?
- Do you have specific and detailed letters of support from partners describing the roles and responsibilities they will fulfill and the resources they will provide?

Employer workforce needs assessment

- Determine the scope and scale of your organization's workforce needs with specificity. What are the expected workforce needs over the lifecycle of the proposed project? Where is there uncertainty about future workforce needs? How will the applicant continually update its understanding of its workforce needs? Be as specific as possible in detailing, the number of jobs, skills requirements, and the timeframe over which the jobs will be needed. In defining skills requirements, please utilize existing competency frameworks, such as those for advanced manufacturing and semiconductor and nanotechnology manufacturing created by the National Institute for Innovation and Technology (NIIT) in consultation with DOL, and available through the competency model clearinghouse, to the extent possible.
- What gaps, both in personnel and skillset, will need to be filled? What are the current challenges for filling identified skill and personnel gaps?
- How do you currently train your workforce? What is effective and what needs improvement?

Regional workforce landscape assessment

- Familiarize yourself with existing analysis of the region. What labor is available regionally? Are there workers with the skills you need or workers with similar skills that can be reskilled? It may be helpful to look at current population, employment, and educational enrollment data, regional economic development strategies such as a Comprehensive Economic Development Strategy (CEDS) or States' WIOA State Plans that include workforce analysis and assessment of regions.¹²⁶
- What are the common avenues for labor recruitment in your region, in particular for recruiting underserved groups (e.g., unions, community-based organizations, etc.)?

¹²⁶ "Economic Development Districts," U.S. Economic Development Administration (U.S. Economic Development Administration, 2023), <https://www.eda.gov/about/economic-development-glossary/edd>; WIOA State Plans available at "The Workforce Innovation and Opportunity Act State Plan," WIOA State Plan Portal (WIOA State Plan, 2023), <https://wioaplan.ed.gov/>.

- What training programs are currently available to you for developing industry talent in the region of your proposed project?
- What workforce programs have proven successful in the proposed project regional area or in other areas? Can existing training programs be scaled for the proposed project or is it necessary to develop new training programs? Consider where new financial support may support existing resources as matching existing financial resource streams with additional support can help support elements of regional workforce systems mostly aligned with the employer's needs.¹²⁷

Worker recruitment and retention

- What financial resources (including both CHIPS Incentives Program dollars and non-CHIPS funding) will you commit to workforce development? Applicants should include details on the amount and source of the funding being allocated to workforce development activities (e.g., outreach, training, wraparound services, etc.).
- What targeted efforts do you plan to take or are you already taking to recruit from new and diverse sources of labor?
- What pre-apprenticeship programs and other training organizations will you be partnering with to expand employment opportunities for individuals from underserved communities?
- How do you plan to implement policies on hiring workers based on skills required for the job rather than degrees earned? This may include changing job requirements or re-writing job descriptions based on common skills competency models.
- Do you track employee turnover and conduct exit interviews with separating employees to understand their reason for leaving your organization?
- Do you conduct employee surveys to understand services your organization may be able to provide or policies your organization may be able to implement to improve employee retention?

Good Jobs Principles approach

- Have you reviewed the Good Jobs Principles and evaluated your organization's recruitment, training, hiring, retention, and advancement policies against the identified principles?
- What new policies or strategies can your organization implement to provide "good jobs" to the semiconductor industry?
- What practices will your organization follow to ensure that the Good Jobs Principles remain applicable to the jobs your organization creates and maintains?

Determining training needs for both new and incumbent worker

- Based on your workforce assessment of needed competencies and available skilled workforce in [section 3.1](#) of this Guide, how many workers will require training to build the competencies or skills needed to fill the available work roles?
- What share of each skill set do you expect to be addressed by external training partners including pre-hiring, versus by your own in-house training and/or apprenticeships? How

¹²⁷ Jake Boyd and Claudia Moreno, "Ours to Solve Together," The Project on Workforce (Harvard College, October 13, 2022), <https://www.pw.hks.harvard.edu/post/ours-to-solve-together>.

much specific internal company training will be needed for the various roles in your workforce? How can you scale up internal programs? What wraparound services are available and appropriate for internal training?

- What external groups do you or will you work with to train your workforce? What resources can you provide to strengthen and support that partnership (e.g., experiential learning opportunities, funding for wraparound services)? What resources can be shared more broadly across the semiconductor training ecosystem to reduce fragmentation?
- What competency standards will you use for training? Is there an official, industry-wide standard for each area or will a competency standard need to be developed? How will you assess if these competency standards are sufficient? How do you update the standard to keep pace with technological changes?
- What role do you see your organization playing in the existing training structure, especially in relation to sectoral partners?

Provision of wraparound services

- Do you have a strategy to provide wraparound supportive services?
- What wraparound services are currently available to workers in your organization beyond those in training programs? Are they sufficient to meet workers' needs? What are the barriers to provide new or expanded wraparound services?
- Have you assessed your region's most critical supportive services needs? These might include linkages to community services, assistance with transportation, childcare and dependent care, housing, needs-related payments, educational testing, work-related tools, reasonable accommodations for individuals with disabilities, legal aid services, referrals to health care, or payment and fees for employment and training-related applications, tests, and certifications.
- In what supportive services gaps in the community do you plan to invest?
- Have you established partnerships with human services agencies, a state or local workforce board, or community-based organizations to support or provide wraparound supportive services? What community-based organizations exist to support this work?
- What other sources of funding (federal, state, etc.) are available and will be tapped (if any) to assist with the provision of wraparound services?

Workforce metrics

- Have you set workforce development goals that are SMART: specific, measurable, achievable, relevant, and time-bound?
- How do you plan to develop systems and a process for accessing and reporting specific and disaggregated data on a timely basis?
- What administrative data sources can be leveraged to report on your metrics of interest?
- What resources are available to your organization for developing data systems and people to assess and report data and evaluate success?
- What is your plan for evaluating workforce development activities over time?

Construction workforce plan

- Have you formed a project labor agreement that includes best practice provisions and dispute resolution processes?
- How do you plan to ensure compliance with federal and state labor law? Have you implemented discrete strategies to monitor compliance?
- What initiatives are you using to increase access to opportunity for women in the trades?

Child care plan

- Have you surveyed your workforce and local providers to assess needs?
- What are you doing to ensure that care is accessible, affordable, high-quality, and reliable for facility and construction workers?
- What is the availability of childcare providers in the area? What are their hours?
- Have you planned initiatives that will increase the supply of child care, particularly at needed hours?
- What is the feasibility of creating on-site child care?
- What partners have you worked with? Has your state or locality made commitments to assist your implementation of a child care plan?
- Is your plan to provide child care near-site, on-site, or elsewhere? What is the rationale for that decision?
- What are your expectations for uptake with respect to child care benefits and how do you plan to communicate the availability of such benefits to workers?

6.2 Pre-Application (optional)

The optional, but recommended, pre-application phase creates an opportunity for dialogue between the Department and the potential applicant to ensure it is ready to meet program requirements and address program priorities. The Department strongly encourages pre-applications for current-generation, mature-node, or back-end production facilities.

Each applicant will have unique workforce needs. The goal of the workforce development component of the pre-application is to give the applicant a chance to receive feedback from the Department on the workforce plan under development. Applicants should provide succinct but detailed descriptions of their understanding of the needs of the proposed project and the proposed strategies to meet workforce needs, including recruiting, hiring, training, and retaining a diverse and skilled workforce.

Ideally, applicants will have made efforts to start identifying potential sectoral partners and can detail progress on partnership development in the pre-application.

Guidance from the NOFO. Each potential applicant must discuss their approach to recruit, train, and retain a diverse and skilled set of workers to fill the good jobs that will be created to operate its semiconductor facilities. Potential applicants should provide a description of:

- Anticipated facility workforce needs
- Proposed strategies to meet facility workforce needs, including proposed equity strategy to promote the hiring and retention of economically disadvantaged individuals
- Approach to meeting the Good Jobs Principles
- Proposed high-quality education and training programs or strategies, such as Registered Apprenticeships, pre-apprenticeship programs, career and college pathways, and wraparound supportive services
- Actions taken to engage with a broad range of potential strategic partners
- Actions taken with respect to creating or participating in a sectoral partnership, such as convening or conducting outreach to potential partner organizations, establishing the constitution and layout of the partnership, defining respective roles and responsibilities, or identifying a backbone organization to facilitate the sectoral partnership

To the extent that the applicant is in discussions with workforce, educational, community-based, public-sector, local housing, or other organizations on proposed collaborations that have not yet been finalized, it should describe the state and goals of those discussions.

The potential applicant may also note any planning it has done, in concert with partners, for meeting their construction workforce needs. However, a construction workforce plan is not required at the pre-application stage.

6.3 Final Submission and Evaluation–Workforce Development Plan

A potential applicant must submit a full application to be officially considered for a CHIPS Incentive Award. The full application will contain extensive, detailed information on the proposed project(s). Because the full application is resource-intensive, the applicant should strongly consider any pre-application feedback when deciding whether to prepare and submit a full application. The Department will engage with the applicant to seek further information or clarifications and provide feedback.

The Department recognizes that developing and implementing a workforce strategy takes time and is dependent on other factors unrelated to the workforce. The Department expects applicants to submit complete workforce development plans at the time of full application to the extent possible with the understanding that the plans may evolve and change over time.

6.3.1. Submission Information

As detailed in the NOFO, strong workforce development plans will meet the following conditions:

- ☐ Not exceed 30 pages¹²⁸
- ☐ Contain the following components:¹²⁹
 - a) Facility Workforce Plan (one for each facility in the project application)
 - i. Workforce Needs Assessment
 - ii. Worker Recruitment and Retention
 - iii. Good Jobs Principles Approach
 - iv. Workforce Training and Wraparound Services
 - v. Metrics and Milestones
 - b) Construction Workforce Plan
 - i. Workforce Needs Assessment
 - ii. Worker Recruitment and Retention
 - iii. Good Jobs Principles Approach
 - iv. Workforce Training and Wraparound Services
 - v. Metrics and Milestones
 - c) Child Care Plan (required for applicants requesting CHIPS Direct Funding over \$150 million and strongly encouraged for others)
- ☐ Identify the overall financial resources that will be committed to these efforts by the applicant and other parties across the workforce system.¹³⁰ This should include commitments of the applicant's financial resources as well as other non-CHIPS Incentives Program resources to fund this effort in a manner that is sustainable over the

¹²⁸ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 49. <https://www.nist.gov/document/notice-funding-opportunity-chips-incentives-program-commercial-fabrication-facilities>.

¹²⁹ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 50-54. <https://www.nist.gov/system/files/documents/2023/02/28/CHIPS-Commercial Fabrication Facilities NOFO 0.pdf>.

¹³⁰ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 49. <https://www.nist.gov/document/notice-funding-opportunity-chips-incentives-program-commercial-fabrication-facilities>.

long-term. Applicants should identify spending by priority (outreach, training, wraparound services, etc.).¹³¹

- Demonstrate appropriate investments and commitments to recruit, train, hire, retain, and upskill a diverse workforce.
- To demonstrate satisfaction of the statutory requirement that the applicant secure “commitments from regional educational and training entities and institutions of higher education to provide workforce training, including programming for training and job placement of economically disadvantaged individuals,”¹³² the applicant must also attach letters of commitment from education and training entities and institutions that detail the specific tasks they will perform in support of the workforce plan and the resources that will be provided, including, but not limited to, programming for training and job placement of economically disadvantaged individuals.¹³³
- Include commitments to working to support long-term, cross-cutting initiatives—such as competency development, curriculum design, and credentialing—that will strengthen the U.S. national semiconductor workforce. See [section 6.4](#) of this Guide for additional information.¹³⁴

6.3.2. Evaluation

The merit review process will assess the strengths and weaknesses of projects’ workforce development plans against the workforce development criterion. The criterion addresses the degree to which the workforce development plans set out a coherent, achievable, and equitable strategy to address talent needs and generate the workforce needed to execute on the applicant’s project goals.¹³⁵ The assessment of this criterion will consider the:

- Completeness, cohesiveness, and feasibility of the strategies and financial plan to recruit, secure, and train the skilled and diverse workforce necessary to complete the proposed projects and operate the facilities, including:
 - Workforce needs assessment
 - Worker recruitment and retention plan
 - Commitment to good jobs as defined by the Departments of Labor and Commerce’s Good Jobs Principles
 - Worker training plan and wraparound services that reduce barriers to access to and completion of the training
 - Metrics for success
- Capacity, resourcing, and cohesiveness of the applicant’s partnerships, including the extent of the applicant’s engagement with a broad range of strategic partners; whether

¹³¹ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 50. <https://www.nist.gov/document/notice-funding-opportunity-chips-incentives-program-commercial-fabrication-facilities>.

¹³² 15 U.S.C. § 4652(a)(2)(B)(ii)(III).

¹³³ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 51. <https://www.nist.gov/document/notice-funding-opportunity-chips-incentives-program-commercial-fabrication-facilities>.

¹³⁴ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 20. <https://www.nist.gov/document/notice-funding-opportunity-chips-incentives-program-commercial-fabrication-facilities>.

¹³⁵ National Institute of Standards and Technology, United States Department of Commerce, *CHIPS Incentives Program – Commercial Fabrication Facilities*, 62-63. <https://www.nist.gov/document/notice-funding-opportunity-chips-incentives-program-commercial-fabrication-facilities>.

the applicant has formed a sectoral partnership; whether there is a clear delineation of roles and responsibilities among partners; and quality of participation commitments of community colleges and other higher education institutions, high school career and technical education programs, labor unions, and other entities

- The depth and quality of the applicant's equity strategy to recruit, hire, train, and retain a skilled and diverse facility and construction workforce, including the specific steps that will be taken to recruit, hire, train, and retain economically disadvantaged individuals and disclose data on workforce and training participant diversity, as well as the extent to which the plan draws on evidence-backed approaches
- Whether the applicant plans to use apprenticeship readiness and other programs that successfully train diverse populations
- Quality of the construction workforce plan, including the completeness, cohesiveness, and feasibility of the strategy to recruit, secure, and train the workforce necessary to complete the proposed project, including whether the applicant plans to use a project labor agreement
- For applicants requesting CHIPS Direct Funding over \$150 million, the sufficiency, quality, and feasibility of the plans to provide facility and construction workers with access to affordable, accessible, reliable, and high-quality child care; for applicants requesting less than \$150 million, quality of plans to provide access to child care for facility and construction workers to the greatest extent feasible

6.4 Additional Workforce Development Pipeline Support

Applicants may include in their narrative supplemental actions they plan to take to strengthen and sustain the U.S. semiconductor workforce pipeline. These efforts should focus on long-term, cross-cutting initiatives such as competency development, curriculum design, and credentialing as much as possible, but additional pipeline support can include, but is not limited to, direct investment, resource sharing, and experiential learning. Applicants may coordinate at both the local level with sector partners and more broadly when possible.

Applicants should consider outreach opportunities that cultivate curiosity among K-12 learners in STEM careers more broadly and for more specific opportunities in the semiconductor industry. For younger learners, this effort could include hosting field trips or developing and collecting grade-appropriate activities to introduce semiconductor technology. Fostering this curiosity is important as one of the key indicators of successful entry to the STEM workforce more broadly is an indicated interest in STEM by eighth grade.¹³⁶ Research shows that girls and young women are exposed to STEM fields and careers at lower rates than boys.¹³⁷ For secondary and post-secondary learners, these strategies can be broadened to include experiential learning opportunities like internships and apprenticeships as discussed in [Section 3.4](#) of this Guide. Fostering interest and excitement at these critical junctures will drive more students to pursue STEM degrees and careers in the semiconductor industry.

Applicants should consider how they can support students in higher education, so they are prepared and excited to enter the semiconductor workforce. As discussed in [Section 3.2](#) of this Guide, undergraduate and graduate students demonstrate strong levels of attrition both during and after their intended degree program. Additionally, employers have identified increasing skill gaps among these workers upon graduation. Applicants should work, when possible, with educational funding partners to provide additional funding and programmatic support, such as career planning resources, to scholarship and fellowship programs already in place.

- Applicants may fund scholarship or fellowship programs of their own but should carefully consider the existing educational funding landscape first. Applicants may consider opportunities to engage and excite students beyond scholarships and fellowships. Prizes, awards, and competitions can engender confidence and excitement while also providing benchmarks and encouragement toward a career in the semiconductor industry.
- To help mitigate skill gaps for both graduate and undergraduate students, applicants should consider providing educators with resources on state-of-the-art techniques and semiconductor curriculum. Examples of universities with targeted programs that can be leveraged or supplemented are listed in [section A.3](#) of this Guide.

¹³⁶Cannady, M. A., Greenwald, E., & Harris, K. N. "Problematising the STEM pipeline metaphor: Is the STEM pipeline metaphor serving our students and the STEM workforce?" *Science Education*, 98 (2014): 443-460. doi: <https://doi.org/10.1002/sce.21108>.

¹³⁷ "Elyse Shaw, MA and Halie Mariano, "Tackling the Gender and Racial Patenting Gap to Drive Innovation," Institute for Women's Policy Research (Institute for Women's Policy Research, July 2021), https://iwpr.org/wp-content/uploads/2021/07/Tackling-the-Gender-and-Racial-Patenting-Gap_FINAL38.pdf.

- Applicants may also consider strengthening educational tools for universities with funding for improved educational laboratories, “train the trainer” programs, or co-op or exchange programs.¹³⁸
- To increase awareness of opportunities in the semiconductor industry for all students, applicants may plan to provide resources on careers in the semiconductor industry in coordination with academic partners as well as to internal programs like internships and workshops.
- To increase diversity in the industry, applicants may develop long-term partnerships with HBCUs, TCUs, and other MSIs.

Applicants should leverage sectoral partnerships in these efforts as much as possible and carefully consider which interventions provide most benefit for investment.¹³⁹ Resources on existing entities, initiatives, and programs aimed at education and workforce development in the semiconductor industry are listed in [Section A.3](#) of this Guide.

Applicants may choose to collaborate with CHIPS-funded entities and programs that have directives to innovate and sustain workforce development for the semiconductor industry. The four entities and programs that make up the CHIPS Research & Development (R&D) program, including the National Semiconductor Technology Center (NSTC), National Advanced Packaging Manufacturing Program, (NAPMP) Manufacturing USA, and the NIST Metrology Program, will strive to create a dynamic, equitable, and inclusive ecosystem for workforce development for research and development in the semiconductor industry. Applicants should consider if and how workforce development efforts by CHIPS R&D entities may be utilized or supported to further workforce development goals beyond incentives investments. The Department of Defense (DoD) is also working to enhance learning opportunities for participation in the semiconductor workforce.

- As outlined in the CHIPS Act, the NSTC is tasked to incentivize and expand participation in graduate, undergraduate, and community college programs and develop workforce training programs and apprenticeships.¹⁴⁰ The NSTC will serve as a coordinating body and center of excellence to scale the technical workforce, including scientists, engineers and technicians. The NSTC will work with the CPO and other agency programs to ensure that workforce development activities are complementary and cohesive. Further information on the workforce development efforts of the NSTC will be detailed in an upcoming white paper that will be available at chips.gov.
- The NAPMP will focus on the needs of the advanced packaging industry and develop workforce efforts that meet those needs.
- The NIST Metrology program will aim to develop next generation technologies and standards for the semiconductor industry and will host workforce development programs to prepare researchers for this work.

¹³⁸ “Infusing Advanced Manufacturing into Undergraduate Engineering Education,” The National Academies Press. (National Academies of Sciences, Engineering, and Medicine, 2022), <https://doi.org/10.17226/26773>

¹³⁹ Analysis of survey data from the National Center for Science and Engineering Statistics may be helpful in this determination: “Surveys & Analysis,” National Center for Science and Engineering Statistics (National Science Foundation, 2023), <https://nces.nsf.gov/surveys-analysis>.

¹⁴⁰ NDAA Section 9906 / 15 U.S.C. § 4656(c)(2)(C)

- Manufacturing USA already has a variety of programs in place for workforce development in advanced manufacturing at its 16 current institutes that will be expanded upon for the semiconductor industry with new forthcoming institutes supported by CHIPS funding.
- As part of their mission statement, the DoD's Microelectronics Commons plans to "enhance the microelectronics education and training pipeline to bolster the microelectronics engineering workforce" in addition to helping create direct pathways for commercialization of lab technologies.¹⁴¹

Applicants may also consider partnering with the National Science Foundation (NSF) to support advancement of the semiconductor workforce and education ecosystem. Through partnership with the NSF, applicants can facilitate expanded experiential training opportunities, provide scholarships, and support the development of semiconductor educational curricula for both students and teachers. See [section A.3](#) of this Guide for a full list of NSF programs and partnership opportunities.

¹⁴¹ "The Microelectronic Commons," U.S. Department of Defense Research & Engineering (Office of the Under Secretary of Defense, Research and Engineering, October 31, 2022), <https://www.cto.mil/ct/microelectronics/commons/>.

Appendix

A.1 Acronyms

ADA	Americans with Disabilities Act
CTE	Career Technical Education
DEIA	Diversity, Equity, Inclusion, and Accessibility
DOC	U.S. Department of Commerce
DoD	U.S. Department of Defense
DOL	U.S. Department of Labor
EDA	U.S. Economic Development Administration
HBCU	Historically Black Colleges and Universities
HHS	U.S. Department of Health and Human Services
MOU	Memorandum of Understanding
MSIs	Minority Serving Institutions
NAPMP	National Advanced Packaging Manufacturing Program
NDAA	National Defense Authorization Act
NOFO	Notice of Funding Opportunity
NSF	National Science Foundation
NSTC	National Semiconductor Technology Center
OSHA	Occupational Safety and Health Administration
PLA	Project Labor Agreement
R&D	Research and development
SMART	Specific, Measurable, Actionable, Realistic, Time-Bound
STEM	Science, Technology, Engineering, and Mathematics
TCU	Tribal Colleges and Universities
WIOA	Workforce Innovation and Opportunity Act

A.2 Job Quality Toolkit

The Department of Commerce Job Quality Toolkit offers employers a comprehensive approach to creating good jobs. Identifying and improving the drivers most valued by workers can significantly increase their satisfaction and engagement, resulting in increased enthusiasm for their work, lower absenteeism, lower turnover, higher retention, better team performance, increased productivity, improved products and services for customers, higher customer satisfaction, and increased revenues. Pay and benefits matter, and so do a multitude of other factors like workplace safety and health, a voice, scheduling predictability, skills building, and advancement.

For more information and resources, including case studies¹⁴² on how organizations have implemented these practices, please access the full Job Quality Toolkit from the Department of Commerce website.¹⁴³

The Toolkit, some of which is reproduced below, provides a high-level summary of actions that support good jobs.

Pay. Provide an equitable living wage to all workers and ensure fair compensation practices.

- Consider what is appropriate for the region.
- Ensure that compensation practices are transparent. Publish and regularly update all career paths and their pay and clearly state the required skills and competencies.
- Conduct pay-equity analysis by gender, ethnicity, and race and report on results transparently.
- Demonstrate fairness and recognition by compensating workers for improving performance based on objective measures.

Benefits. Seek workers' input on needed and desired benefits, such as paid leave, health insurance, and a retirement plan. Provide them and encourage their use.¹⁴⁴

- Tailor services, benefits, and policies to the diverse needs of your workforce groups and segments. Regular assessments can help match services, benefits, and policies to worker needs.
- Offer health benefit options that meet the needs of the entire workforce and provide employer contributions toward premiums.
- Offer mental health benefits.
- Offer paid time off in support of work-life balance and wellness including safe and sick/medical leave, family leave, vacation and holidays, bereavement leave, and emergency child care or eldercare leave.
- Offer retirement savings programs such as a 401(k) or similar program, provide an employer match to employee contributions, and provide a variety of investment options.

¹⁴² "Job Quality Case Studies," U.S. Department of Commerce (U.S. Department of Commerce, August 4, 2022), <https://www.commerce.gov/work-us/job-quality-toolkit/job-quality-case-studies>.

¹⁴³ "Job Quality Toolkit," U.S. Department of Commerce (U.S. Department of Commerce, August 4, 2022), <https://www.commerce.gov/work-us/job-quality-toolkit>.

¹⁴⁴ "Benefits, Job Quality Toolkit," U.S. Department of Commerce (U.S. Department of Commerce, August 4, 2022), <https://www.commerce.gov/sites/default/files/2022-08/Benefits-Driver-Job-Quality.pdf>.

- Offer liquid savings programs such as short- and long-term savings plans to help workers weather financial shocks.
- Offer benefits to part-time as well as full-time workers.
- Eliminate worker misclassification by reviewing and properly classifying workers as employees rather than independent contractors.
- Financially support learning and skill building. See [section 3.4](#) of this Guide for more information.
- Reduce the cost and burden of commuting by providing free or subsidized public-transit options.
- Offer child care and eldercare benefits. See [section 5](#) of this Guide for more information.
- Offer transportation support such as public transportation vouchers or gas cards.
- Offer tax benefits such as pre-tax deduction benefits.
- Promote worker financial wellness by offering employee stock ownership plans, stock options, and profit sharing.
- Encourage benefit uptake and use.

Diversity, Equity, Inclusion, and Accessibility (DEIA). Make equal opportunity a core value and practiced norm. Foster systems where all workers feel respected and empowered in the workplace. Identify and remove systemic barriers to DEIA.¹⁴⁵

- Assess the organization's internal equity policies, practices, and organizational culture to assess alignment with your organization's values and its practices. Communicate to employees the organization's pay-setting practices and structures and conduct pay equity audits by gender, race, ethnicity, and disability status. Use data and metrics to set a baseline and measure progress.
- Institutionalize accountable, systemic change. Clearly identify a senior leader responsible for developing a DEIA strategy, monitoring outcomes, managing roadblocks, and making necessary adjustments along the way. Actionable items include avoiding gender-coded language in written and or verbal communications (i.e., use of "she or he" for candidate/employee references), using accessible language (e.g., to individuals for whom English is a second language), and ensuring that the organization's online platforms and physical facilities are accessible to persons with disabilities.
- Empower the workforce to speak out against bias and discrimination in the workplace and speak for DEIA without fear of retaliation. Ensure that your employees have multiple channels to report concerns, voice opinions, and offer feedback; and adopt robust anti-retaliation measures to ensure that they may safely do so.
- Offer and consider requiring employees to participate in DEIA training that aligns with the organization's mission and values.
- Use mentorship, coaching, and sponsorship to help diverse talent advance and design formal mentoring programs that align with employees' career interests and needs.
- Establish recovery-ready workplace policies.

¹⁴⁵ "Diversity, Equity, Inclusion, & Accessibility, Job Quality Toolkit," U.S. Department of Commerce (U.S. Department of Commerce, August 2022), <https://www.commerce.gov/sites/default/files/2022-08/DEIA-Driver-Job-Quality.pdf>.

Empowerment and Representation. Ensure that workers have a meaningful voice, without fear of retaliation. Enable workers to contribute to decisions about their work, how it is performed, and organizational direction.¹⁴⁶

- Communicate with—and listen to—your workers systemically and frequently by developing regular, repeatable processes for communicating, conversing, actively listening, and providing feedback on worker inputs.
- Give your workforce a meaningful voice through formal structures that protect workers. Establish and promote clear worker complaint and investigation policies and procedures that include robust protection from retaliation. Create systems that receive and implement worker input on process improvements and innovation and inform workers how their input was used.
- Ensure that workers can organize. Employers should remain neutral during organizing activity and ensure that barriers to workers' organizing or collective bargaining are removed.
- Assess workforce satisfaction and engagement by regularly soliciting feedback directly from the workforce.

Job Security and Working Conditions. Ensure a safe, healthy, and accessible workplace and offer job security. Minimize temporary or contractor labor solutions, using such workers mainly to adjust for short-term needs. Assess and schedule hours that are adequate and predictable.¹⁴⁷

- Increase job security by minimizing part-time and contingent work, which can cause job insecurity and deprive workers of important benefits and protections. Plan to prevent workforce reductions and minimize the impact of any necessary reductions.
- Ensure that workers are physically safe. Prohibit and prevent all forms of violence in the workplace, including verbal, physical, and gender-based violence, as well as sexual harassment.
- Ensure that workers are psychologically safe by supporting workers' sense of well-being at work.
- Anticipate and respond with agility to reduce job strain. Utilize ongoing assessments of work activity, intensity, risk, and need for flexibility to adjust or lessen worker stress and adjust staffing. adjust staffing to accommodate those times. Make staffing decisions to maximize product and service effectiveness and customer value and not to meet payroll targets.
- Protect workers' data and information.
- Offer stable and predictable hours to all workers.
- Offer flexible remote work options (when possible given required job tasks).

¹⁴⁶ "Empowerment & Representation, Job Quality Toolkit," U.S. Department of Commerce (U.S. Department of Commerce, August 2022), <https://www.commerce.gov/sites/default/files/2022-08/Empowerment-Representation-Driver-Job-Quality.pdf>.

¹⁴⁷ "Job Security & Working Conditions, Job Quality Toolkit," U.S. Department of Commerce (U.S. Department of Commerce, August 2022), <https://www.commerce.gov/sites/default/files/2022-08/Job-Security-Working-Conditions-Driver-Job-Quality.pdf>.

Organizational Culture. Demonstrate through explicit behaviors and norms of leadership that all workers belong, are valued, and contribute meaningfully to the organization. Assess workers' engagement and feelings of respect.¹⁴⁸

- Infuse the workplace with respect and trust—show how your organization values workers by being explicit about values and behaviors that demonstrate respect and trust in your organization. Make leaders role models and accountable for those values.
- Be intentional and strategic about improving the workplace climate. Set goals and measure progress toward those goals. Share tracked results for workforce engagement, satisfaction, and commitment to the organization's work.
- Ensure that the workforce reflects the community and the organization by recruiting, hiring, and onboarding a workforce that represents the diversity of ideas, cultures, and thinking in your organization's hiring and customer communities.
- Make leaders accountable for workplace culture.
- Actively manage change by preparing for and managing any periods of workforce growth or downsizing or changes in organizational structure, workplaces, work systems, and technology.

Skills and Career Advancement. Provide opportunities and tools for workers' self-realization and advancement in their current jobs, within the organization, and outside it.¹⁴⁹

- Communicate clear, transparent career paths within the organization, along with the skills, competencies, and experiences needed to progress on those paths. Offer multiple training opportunities that lead to industry-recognized credentials such as a certificate, license, or degree. See [section 3.4](#) of this Guide for more information.
- Cross-train workers such that employees and managers have ownership and specialization over a specific department but can step in to help other departments when needed.
- Provide ongoing and regular performance reviews and promotions. Establish clear and transparent promotion pathways that prioritize internal candidates.
- Establish a performance management system that uses compensation, rewards, recognition, and other incentives to encourage high performance, intelligent risk taking, and a customer and business focus. Create clear and transparent off- and on-ramps to full-time work.
- Evaluate the effectiveness of your learning and development programs. See [section 3.5](#) of this guide for more information.

¹⁴⁸ "Organizational Culture, Job Quality Toolkit," U.S. Department of Commerce (U.S. Department of Commerce, August 2022), <https://www.commerce.gov/sites/default/files/2022-08/Organizational-Culture-Driver-Job-Quality.pdf>.

¹⁴⁹ "Skills & Career Advancement, Job Quality Toolkit," U.S. Department of Commerce (U.S. Department of Commerce, August 2022), <https://www.commerce.gov/sites/default/files/2022-08/Skills-Career-Advancement-Driver-Job-Quality.pdf>.

A.3 Industry Specific Training and Workforce Development Resources

Advance CTE

Advance CTE is the longest-standing national non-profit that represents State CTE Directors and state leaders responsible for secondary, postsecondary and adult Career Technical Education (CTE) across all 50 states, the District of Columbia and U.S. territories.¹⁵⁰ Its mission is to support state CTE leadership to advance high-quality and equitable CTE policies, programs and pathways that ensure career and college success for each learner. Advance CTE oversees CTE: Learning that works for America®, a national branding campaign to support the promotion of high-quality CTE. Over 700 local schools, districts and organizations use the campaign's brand and resources to communicate the benefits of high-quality CTE to all stakeholders.

The National Career Clusters Framework provides structural alignment and a common language to bridge education and work, empowering each learner to explore, decide and prepare for dynamic and evolving careers. Advance CTE maintains two Career Clusters® relevant to the semiconductor industry: manufacturing and science, technology, engineering, and mathematics.¹⁵¹

IUE-CWA

As the Industrial Division of Communications Workers of America (CWA), IUE-CWA represents a force of 150,000 active and retired men and women united collectively to seek dignity on the job and secure futures for industry workers and future generations.¹⁵² Members of the Communications Workers of America (CWA) are part of one of America's largest and most diverse unions. Training opportunities, scholarships, and other resources are available.

MSSC Pre-Apprenticeship Program

Five years ago, IUE-CWA started a pilot pre-apprenticeship program at Northridge H.S. in Dayton, Ohio, to prepare students for careers in IUE-CWA represented manufacturing facilities in the area. The program has expanded into other areas schools, with several other districts in Ohio, Virginia, and Kentucky showing interest in the program.

The MSSC certification is also a key component of the nationally recognized IMT (Industrial Manufacturing Technician). This program creates a pre-apprenticeship certification for production workers, increasing their wages and starting them on the path to a skilled trade.

IUE-CWA Skilled Trades Program

The IUE-CWA Skilled Trades apprenticeship program is designed to increase the trades workers in IUE-CWA represented facilities and specifically focuses on recruiting and training people of color and women who are often underrepresented in skilled trades positions. The program's Skilled Trades classification system is relevant to the vast majority of IUE-CWA represented manufacturing facilities and IUE-CWA Journeyman cards are nationally recognized and transferable to any factory.¹⁵³

¹⁵⁰ "Advance CTE," Advance CTE (Advance CTE: State Leaders Connecting Learning to Work, 2023), <https://careertech.org/>.

¹⁵¹ "Pathways to College & Career Readiness: Career Clusters," Advance CTE (Advance CTE: State Leaders Connecting Learning to Work, January 12, 2023), <https://careertech.org/the-framework>.

¹⁵² "IUE-CWA, A Force for Working Families AFL CIO," IUE-CWA (IUE-CWA, 2023), <https://www.iue-cwa.org/>.

¹⁵³ "IUE-CWA Skilled Trades Program," IUE-CWA (IUE-CWA, 2023), <https://www.iue-cwa.org/skilled-trades-program>.

201 E Team Machinist Training Program

IUE Local 201 in Lynn, MA co-founded the E-Team Machinist Training Program provides free, in-depth job training for aspiring machinists, especially those that are unemployed or underemployed.¹⁵⁴

Federation for Advanced Manufacturing Education

The Federation for Advanced Manufacturing Education (FAME) provides workforce development through technical training, integration of manufacturing core competencies, intensive professional practices, and intentional hands-on experience to build the future of the modern manufacturing industry.¹⁵⁵

FAME was created by Toyota and moved to the Manufacturing Institute¹⁵⁶ for national scaling in 2019. Today, the Manufacturing Institute, as the workforce development and education partner of the National Association of Manufacturers,¹⁵⁷ is proud to manage FAME USA as it continues to grow across the country with the support of more than 400 manufacturers.

The Advanced Manufacturing Technician (AMT) program administered under the FAME model leverages a work/learn framework to weave technical knowledge, professional behaviors and distinct manufacturing core exercises into a focused co-op experience to build global-best, entry-level, multiskilled maintenance technicians.

Industrial Manufacturing Technician Apprenticeship

The Industrial Manufacturing Technician Apprenticeship (IMT)¹⁵⁸ is a nationally recognized apprenticeship registered with the U.S. Department of Labor that trains front-line manufacturing production workers. Employers participate by identifying skill requirements for your company, hiring new workers, or selecting current workers as apprentices, and providing mentors to deliver on-the-job learning. A broad coalition of labor unions and manufacturing employers specified the job tasks, skills, performance standards, and helped to design supporting curriculum. Related instruction for the IMT apprenticeship is based upon the Manufacturing Skills Standards Council (MSSC) Certified Production Technician national industry standards.

Manufacturing Extension Partnership

The National Institute of Standards and Technology's (NIST) Manufacturing Extension Partnership (MEP) is a public-private partnership with Centers in all 50 states and Puerto Rico dedicated to serving small and medium-sized manufacturers.¹⁵⁹ For the past 30 years, the MEP National Network™ has equipped small and medium-sized manufacturers with the resources needed to grow and thrive. Industry experts work side-by-side with manufacturers to reduce costs, improve efficiencies, develop the next generation workforce, create new products, find new markets and much more. Together, they strengthen communities and U.S. manufacturing.

¹⁵⁴ "E-Team Machinist Training Program," E-Team Machinist Training Program (E-Team Machinist Training Program, 2018), <https://eteamhome.net/>.

¹⁵⁵ "Global Best Skills Training Program," FAME USA (FAME USA, 2023), <https://fame-usa.com/fame-program-for-manufacturers/>.

¹⁵⁶ "FAME," The Manufacturing Institute (National Association of Manufacturers, 2023), <https://www.themanufacturinginstitute.org/workers/fame/>.

¹⁵⁷ "The Manufacturing Institute," The Manufacturing Institute (National Association of Manufacturers, 2023), <https://www.themanufacturinginstitute.org/>.

¹⁵⁸ "Industrial Manufacturing Technician Apprenticeship," Industrial Manufacturing Technician Apprenticeship (Industrial Manufacturing Technician Apprenticeship, February 17, 2017), <https://www.imtapprenticeship.org/>.

¹⁵⁹ "Manufacturing Extension Partnership (MEP)," National Institute of Standards and Technology (National Institute of Standards and Technology, January 30, 2023), <https://www.nist.gov/mep>.

MEP Centers and partners have developed a wide range of services and initiatives to enable manufacturers to identify opportunities that will accelerate and strengthen growth and competitiveness in the global marketplace, including resources on assessment and planning, attraction and recruitment, training and development, engagement and retention, and becoming and employer of choice.¹⁶⁰

Manufacturing USA Institutes

Manufacturing USA consists of a national network of linked manufacturing institutes that work to foster innovation.¹⁶¹ Each has a unique technological concentration but is also designed to accelerate the entire U.S. advanced manufacturing. One of the key initiatives of the Institutes is workforce development. A few of the institutes are highlighted below.

NextFlex

NextFlex takes key steps toward furthering U.S. development and adoption of the flexible hybrid electronics (FHE) that will revolutionize the way Americans live, work and play. NextFlex Learning Programs is the workforce development and education arm of the Institute and has a portfolio that focuses on advanced manufacturing through awareness building, recruitment, and skill building for the advanced manufacturing sector and FHE community.¹⁶²

FlexFactor is an outreach, recruitment, and STEM education program designed to familiarize K-12 students with advanced manufacturing technology, entrepreneurship, and the education and career pathways that can lead to a STEM career. The program was designed to showcase the promise of these careers and help students to develop the critical thinking, creative reasoning, and problem-solving skills needed for future success.

Flex2Future is a work-based learning program designed to allow colleges to easily integrate on-the-job training into advanced manufacturing career pathways.

PowerAmerica

PowerAmerica brings together the brightest minds in the wide bandgap (WBG) semiconductor world. Semiconductor manufacturers and the companies that use power semiconductors in their products are working together to accelerate the adoption of next generation silicon carbide and gallium nitride power electronics. PowerAmerica's education and workforce initiatives aim to train the next generation of WBG students at U.S. universities and train the workforce in WBG technologies by offering short courses and technical webinar series, and by matching students with employers.¹⁶³

MxD

In partnership with the Department of Defense, MxD equips U.S. factories with the digital tools, cybersecurity, and workforce expertise needed to begin building every part better than the last. MxD can help communities build a manufacturing workforce of the future. With programs in places ranging from high school to the factory floor, MxD focuses on helping companies train

¹⁶⁰ "Workforce Development for Manufacturers, Manufacturing Extension Partnership," National Institute of Standards and Technology (National Institute of Standards and Technology, December 5, 2022), <https://www.nist.gov/mep/workforce-development-manufacturers>.

¹⁶¹ "Institutes," Manufacturing USA (Manufacturing USA 2023), <https://www.manufacturingusa.com/institutes>.

¹⁶² "Learning Portfolio, Developing the Advanced Manufacturing Workforce of the Future," NextFlex (NextFlex, June 13, 2022), <https://www.nextflex.us/learning-portfolio/>.

¹⁶³ "Education and Workforce Development," PowerAmerica (North Carolina State University, PowerAmerica, 2023), <https://poweramericainstitute.org/education-and-workforce-development/>.

and retain skilled workers who are nimble and digitally savvy to overcome current skills and perception gaps in the manufacturing sector. Many students and their families lack an accurate understanding of a modern factory environment, and MxD is working to rectify that.

Micro Nano Technology Education Center

The overarching goal of The Micro Nano Technology Education Center (MNT-EC) is to grow the MNT technician workforce by fostering academic and industry mentorship between existing MNT partners and educators developing prospective community college MNT programs.¹⁶⁴ MNT-EC is working on the following objectives to achieve this goal:

1. Developing a coordinated national approach to advance MNT education. This objective is being accomplished by:
 - Strengthening and fostering creation of new MNT programs across the United States.
 - Developing a single curated online repository and distance education opportunities.
 - Engaging industry to identify educational needs in technical education.
2. Delivering professional development to enhance knowledge, skills, and abilities. This objective is being accomplished by:
 - Facilitating workshops and professional conferences on emerging MNT technologies.
 - Delivering hands-on laboratory education.
 - Producing industry and education podcasts.
3. Conducting strategic outreach, recruitment, and retention of traditional and underrepresented faculty/students. This objective is being accomplished by:
 - Coordinating effort to recruit African American, Latin/x, and women faculty and students.
 - Providing support and outreach to active-duty military and veterans.
 - Communicating MNT career benefits to increase awareness among students and parents.
4. Creating deep Industry/Education Alliance that supports student success. This objective is being accomplished by:
 - Providing work-based learning opportunities to students through industry connections.
 - Creating internships and employment database.
 - Organizing a national Business and Industry Leadership Team (BILT).
 - Defining and correlating student outcomes with industry skill requirements.

National Institute for Innovation and Technology

The National Institute for Innovation and Technology (NIIT) is a U.S. Department of Labor (USDOL) funded Registered Apprenticeship Industry Intermediary contractor charged with establishing and expanding Registered Apprenticeship Programs in Semiconductor and Nanotechnology industries and their related supply chain. NIIT has implemented the Growing Apprenticeships in Nanotechnology and Semiconductors program (GAINS) to expand access to USDOL Registered Apprenticeship Programs with a specific focus on underrepresented populations. GAINS leverages regional assets and organizations to meet the needs of individual employers. The implemented Registered Apprenticeship programs rely on the “learn and earn” model and competency-based training for mechanical and electrical skill sets. One goal of the

¹⁶⁴ “Micro Nano Technology Education Center,” Micro Nano Technology Education Center (Pasadena City College and National Science Foundation, Micro Nano Technology Education Center, 2023), <https://micronanoeducation.org/>.

program is to increase employee retention by enabling participants to advance along multiple career pathways within an organization. GAINS also has a component that enables returning service men and women to leverage their experience and quickly advance through the program.

The NIIT is also establishing “regional talent pipeline hubs” around the nation where ecosystems supporting these related industries exist. Facilitated by NIIT’s industry and education experts, regional stakeholders including employers, educators, and other workforce development entities evaluate educational programs (K-12, college, adult education) to determine the presence and extent of experiential learning, curriculum alignment with industry requirements, and appropriate facilities, equipment, and instructors. NIIT and the regional team also evaluate whether the education pathway is interconnected, transparent, and easy to access for the area population, with a dedicated focus on returning service members and their families. After evaluation, the team works together to determine gaps and develop solutions employing NIIT technical assistance, programs, and infrastructure.

NIIT developed the “National Talent Hub” portal with the support and partnership of the National Science Foundation Advanced Technological Education Program (NSF-ATE) and the USDOL Employment and Training Administration (USDOL-ETA). The portal serves as a gateway for talent to employers and training providers and ensures real-time, detailed alignment and connectivity between industry, academia and individuals. It is a competency-based system which reflects relevant, validated industry required knowledge skills and abilities (KSAs) for Advanced Manufacturing and the Semiconductor industry. The system houses the NIIT’s “Comprehensive Competency Standards Database”, which was developed by evaluating existing databases and constructing a single, up-to-date database, as well as the nation’s first Semiconductor Competency Standard, which was developed by the NIIT. This database provides a foundation for what is now a fully automated system that uses advanced data analytics to align industry/jobs with education/training course curriculum, credentials and certificates, and individual skills profiles. The system translates data into industry recognized KSAs regardless of credential, certificate, degree or source of experience. GAINS leverages the National Talent Hub to assess individual skills and identify skills gaps, target training, provide career mapping services and to build related training programs, as well as to create a “pre-apprenticeship pathway” by enabling participants in education and training programs at all levels to participate in the program.

National Science Foundation

The National Science Foundation (NSF) is one of the leading investors in building the science, technology, engineering, and mathematics (STEM) workforce of the future and ensuring that the Nation is well-positioned to meet the growing STEM workplace demands. Through many of its workforce development activities, the agency makes significant investments in preparing, nurturing, and broadening the representation of scientists, technicians, engineers, mathematicians, educators, and entrepreneurs who can give rise to research breakthroughs and major technological advancements that contribute to the Nation’s overall security and economic competitiveness. For nearly 75 years, NSF has demonstrated a track record of enhancing learning and teaching and achieving excellence in STEM education at all levels and in all settings.

NSF has developed an expansive and inclusive range of workforce development programs, broadly supporting science and engineering, including learners in K-12 schools, community colleges, and universities, as well as reskilling for current workers and upskilling for those

seeking to enter the workforce in new and emerging areas. Through its programs, NSF is already funding institutions of higher education to:

- Expand training opportunities through experiential education;
- Broaden and democratize access to semiconductor fabrication and prototyping experiences central to advancing a future workforce for this topic area;
- Increase the education/training and scholarships for students, which includes the creation of new programs of study, courses, and materials as well as the adaptation and implementation of existing efforts;
- Proliferate the adaptation and implementation of evidence-based curricula and pedagogies in different STEM career pathways, through curricular and/or pedagogical training for higher education faculty and/or secondary teachers, better integration and encapsulation of curricula for sharing, broader dissemination networks, collaboration, and networking opportunities;
- Align and incorporate industry, professional, technical standards in teaching and learning and/or incorporating career skills into training and education modalities, thereby increasing access to, and interest in, different career pathways in STEM;
- Integrate systematic, exemplary approaches to advance inclusive and equitable STEM education;
- Build the capacity for institutions' rapid response to the changes in the STEM-oriented and skilled technician workforce; and
- Investigate student success in academia and/or in the workforces in semiconductors and/or associated fields.

As described below, multiple programs created and executed by NSF are “shovel-ready” for the Department of Commerce (DOC) and CHIPS Incentives Program. NSF and its current partners are investing more than \$350 million annually in these programs. Additional investments would enable scaling and strengthening of the impact of these programs on workforce development for the benefit of the semiconductor and microelectronics industries. Moreover, by considering the full range of workforce development programs supporting the U.S. semiconductor and microelectronics industries,

NSF Programs

- **Advanced Technological Education (ATE)** program focuses on two-year colleges (community and technical colleges) and the education of technicians for the high-technology fields that drive our nation's economy, including semiconductor and microelectronics technology. The program invests in nearly 40,000 students and 9,000 teachers annually. It involves partnerships between academic institutions (grades 7-12, IHEs), industry, and economic development agencies to promote improvement in the education of science and engineering technicians at the undergraduate and secondary school levels. The program supports curriculum development; professional development for college faculty and secondary school teachers; career pathways; apprenticeships; internships; reskilling for incumbent workers; and other activities. The program also supports applied research that advances the knowledge base related to technician education, academically talented students and has supported more than 100,000 students across the nation since 2006.¹⁶⁵

¹⁶⁵ “Advanced Technological Education (ATE),” National Science Foundation (National Science Foundation, July 8, 2021), <https://beta.nsf.gov/funding/opportunities/advanced-technological-education-ate>.

- **NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)** program provides scholarships for low-income students with academic ability, talent, or potential in many STEM fields, including those related to semiconductor design and manufacturing. The program seeks to increase the number of low-income students who graduate from two-year and four-year colleges and universities with a STEM degree and contribute to the American innovation economy. Recognizing that financial aid alone cannot increase retention and graduation in STEM, the program also invests in adapting, implementing, and studying evidence-based curricular and co-curricular activities that have been shown to be effective in supporting student recruitment, retention, transfer, and graduation. The program has supported over 100,000 students in nearly every state, plus Puerto Rico and the U.S. Virgin Islands, in the last 15 years. The program encourages collaborations among universities, industry, local community organizations, national labs, and other federal, state, and tribal government organizations.¹⁶⁶
- **Experiential Learning for Emerging and Novel Technologies (ExLENT)** program providing experiential learning opportunities to students interested in the semiconductors and microelectronics workforce. The ExLENT program, which NSF launched in Fall 2022, invests in expanding access to career-enhancing experiential learning opportunities for a broader, more diverse population, including adult learners interested in re-skilling and/or upskilling (e.g., those who face or who have faced significant barriers to accessing a formal STEM education); promoting cross-sector partnerships between organizations in emerging technology fields and those with expertise in workforce development; and developing a workforce aligned with regional economies based on emerging technologies across the Nation. NSF anticipates touching hundreds of learners with an inaugural set of awards in 2023.¹⁶⁷
- **Non-Academic Research Internships for Graduate Students (INTERN)** in semiconductor and microelectronics research and development. NSF invests in hundreds of thousands of graduate students annually. Aligned with its commitment to supporting graduate students, the INTERN program invests in supplemental funding requests for up to an additional six months of graduate student support on active NSF grants, providing graduate students with opportunities to augment their academic research with non-academic research internship activities and training opportunities that will complement their academic research training; and pursue new activities aimed at acquiring professional development experience that will enhance their preparation for multiple career pathways for graduation. Of particular interest is the participation of graduate students from groups underrepresented in STEM.¹⁶⁸
- **Research Experiences for Undergraduates (REU)** supports meaningful research opportunities across science and engineering topics supported by NSF. Approximately 6,000 students participate in NSF REU sites every year. The typical REU site provides 8

¹⁶⁶ “NSF Scholarships in Science, Technology, Engineering, and Mathematics Program (S-STEM),” National Science Foundation (December 2, 2022), <https://beta.nsf.gov/funding/opportunities/nsf-scholarships-science-technology-engineering>.

¹⁶⁷ “Experiential Learning for Emerging and Novel Technologies(ExLENT),” National Science Foundation (National Science Foundation, October 17, 2022), <https://beta.nsf.gov/funding/opportunities/experiential-learning-emerging-novel-technologies>.

¹⁶⁸ “Non-Academic Research Internships for Graduate Students (INTERN) Supplemental Funding Opportunity,” National Science Foundation (National Science Foundation, October 8, 2020), <https://beta.nsf.gov/funding/opportunities/non-academic-research-internships-graduate>.

to 10 weeks of research and professional development activities for about 10 students, of whom many are women, persons with disabilities, or Black, Hispanic, or other underrepresented minorities. NSF and Semiconductor Research Corporation (SRC) recently signed a memorandum of understanding to support hands-on research opportunities for undergraduate students in research areas related to semiconductors. This partnership will advance the fundamental science and engineering of semiconductors and the development of a diverse science and engineering workforce for an area of high national priority.¹⁶⁹

- **CSGrad4US Fellowships, eFellows, and MPS-Ascend** seek to increase the number and diversity of students engaging in advance degree programs in areas of relevance to the semiconductor industry and to the computing fields that both drive semiconductor R&D and build from it. Now in its third year, CSGrad4US program is highly scalable and was initiated to reverse troubling trends regarding US student engagement in the research pipeline, and to produce sufficient domestic expertise in areas of national need.¹⁷⁰ MPS-Ascend¹⁷¹ and eFellows¹⁷² focus on post-doctoral researchers working to advance fundamental and process development questions relevant to the semiconductor industry.
- **Supplements for Semiconductor Fabrication and Prototyping** are available for researchers and educators to expand researcher and student access to semiconductor fabrication experiences. These opportunities can be viewed as a scalable crosscut across the programs listed above, and others.¹⁷³

Of particular interest to NSF are two-year/community colleges and Minority Serving Institutions, Historically Black Colleges and Universities, Tribal Colleges and Universities, and Alaska Native and Native Hawaiian Serving Institutions, in which groups historically underrepresented and underserved in STEM are showing increased interest in advanced technology careers.

NSF also has established relationships with two-year/community colleges and Minority Serving Institutions (e.g., Hispanic Serving Institutions (HSIs), Historically Black Colleges and Universities (HBCUs), Tribal Colleges and Universities (TCUs), and Alaska Native and Native Hawaiian Serving Institutions (ANNH)), in which groups historically underrepresented and underserved in STEM are showing increased interest in advanced technology careers.

NSF is already working with industry and other partners to customize educational offerings to diverse student populations. These range from two-year/community college enrollees to adult learners in search of reskilling or upskilling certification, broadening career pathways for these students to land full-time advanced technology jobs, following the completion of their degree

¹⁶⁹

National Science Foundation, *Research Experiences for Undergraduates*, (June 8, 2022) <https://www.nsf.gov/pubs/2022/nsf22601/nsf22601.htm>.

¹⁷⁰ "CSGrad4US," National Science Foundation (National Science Foundation, October 25, 2022) <https://www.nsf.gov/cise/CSGrad4US/>.

¹⁷¹ "Mathematical and Physical Sciences Ascending Postdoctoral Research Fellowships (MPS-Ascend)," National Science Foundation (National Science Foundation, October 11, 2022), <https://beta.nsf.gov/funding/opportunities/mathematical-physical-sciences-ascending>.

¹⁷² "About the eFellows Program," National Science Foundation and American Society for Engineering Education (American Society for Engineering Education, 2021), <https://efellows.asee.org/home>.

¹⁷³ "Supplements for Access to Semiconductor Fabrication," National Science Foundation (National Science Foundation, August 16, 2022), <https://beta.nsf.gov/funding/opportunities/supplements-access-semiconductor-fabrication-asf>.

and/or certificate programs. CHIPS applicants can directly partner with NSF to enhance the workforce development opportunities for diverse talent across the industry.

National Semiconductor Economic Roadmap

The National Semiconductor Economic Roadmap (NSER) was conceived and commissioned by the Arizona Commerce Authority (ACA) and developed by industry leaders, academic institutions, state entities, and the Boston Consulting Group. This first-of-its-kind roadmap is an industry-led initiative designed to advance semiconductor competitiveness and craft a blueprint to future-proof semiconductor manufacturing in the US. More than 80 industry leaders, educational institutions and public sector leaders from states around the nation came together to collaborate and develop the NSER, which outlines goals and objectives across four key pillars: infrastructure, supply chain, workforce, and entrepreneurship.

The NSER includes a chapter on workforce which provides background information about the semiconductor workforce and identifies workforce challenges. Also included is the NSER Action Plan which sets visions for the semiconductor workforce and proposes high level initiatives with examples.

The workforce vision includes:

- The number of students who enter the semiconductor pipeline increases significantly due to teaching, mentoring, and transitioning a diverse population into the industry.
- The semiconductor industry retains its talent pool by reversing attrition factors.
- The workforce is adaptable to the advancing needs of the industry.¹⁷⁴

New Manufacturing Alliance

The New Manufacturing Alliance brings together manufacturers in a united voice to solve workforce skills challenges. The businesses have partnered with; K-16 education, workforce boards, economic development organizations, and others to change the image of manufacturing in northeast Wisconsin. They offer numerous resources for business, educators, students, and job seekers.

NY CREATES

NY CREATES aims to further accelerate the growth of high-value, high-technology companies, by attracting entrepreneurs to New York State, and supporting them through ideation, incubation, and investment phases. NY CREATES continues the long-standing push to provide an invigorating environment for high technology industries. NY CREATES serves as a resource for public-private and academic partnerships within New York State to create and lead industry connected innovation and commercialization projects that attract investment and create growth in high technology jobs.

NY Creates partnered with the National Science Foundation (NSF) to create Vet S.T.E.P., a hands-on, high tech training internship for veterans to earn the skills to earn tech 1 certification for the semiconductor industry. The program consists of two weeks of training and 8 weeks of

¹⁷⁴ "The National Semiconductor Economic Roadmap," Arizona Commerce Authority and Boston Consulting Group (Arizona Commerce Authority, December, 2022), <https://www.azcommerce.com/media/ndyorum2/national-semiconductor-economic-roadmap-nser.pdf>.

internships with a semiconductor company, is free of charge, and provides housing for participants.¹⁷⁵

The Ohio Manufacturers' Association

The Ohio Manufacturers' Association (OMA) strives to protect and grow Ohio manufacturing. While Ohio manufacturing businesses are their constituency, OMA provides numerous workforce development tools and resources for free on their website:

- Tools & Resources for Industry Sector Partnerships
- Tools for Sector Partnership Launch
- Tools for Sector Partnership Implementation
- Tools for Earn-and-Learn Programs
- How-to-Guides (including recruiting)

See the workforce services page for a full list of available resources.¹⁷⁶

OhioTechNet

OhioTechNet (OTN) is accelerating innovation by creating education-industry partnerships that work to fill today's high-tech manufacturing jobs for the next generation. OTN is a consortium of career technical centers, Ohio Technical Centers, community colleges and universities, who have partnered with The Ohio Manufacturers' Association (OMA) and other state and national partners to make Ohio a leader in solving the manufacturing workforce shortage.

OTN partners have expanded registered apprenticeship programs and launched other Earn & Learn models that align with Ohio's most in-demand jobs. Expertise within the consortium accelerates the adoption of these models among partner institutions – creating a win-win for students who can complete training with little-to-no debt, and employers who can build a sustainable talent pipeline for entry-level and skilled positions.¹⁷⁷

SEMI Foundation

The SEMI Foundation is the 501(c)(3) arm of SEMI, the global industry association representing the microelectronics manufacturing and design supply chain. The Foundation leads the association's global workforce development and diversity, equity, and inclusion initiatives.

The Foundation is uniquely positioned to bring together companies, academia, and a wealth of other partners to create a stronger, more diverse industry workforce.

In partnership with its member companies, the Foundation has developed a world-class portfolio of programs and resources to assist individual companies, industry coalitions, and workforce development systems. This workforce development portfolio allows partners to leverage ongoing work to create embedded, successful, and scalable workforce development ecosystems that also incorporate diversity, equity, and inclusion best practices.

The SEMI Foundation offers support packages that can be customized to assist company- or coalition-based initiatives. Programs and services include:

- [High Tech U](#) – an outreach initiative to K-12 schools, districts, and adjacent programs
- [VetWorks](#) – supports for recruiting, hiring, and retaining veterans

¹⁷⁵ "Vet S.T.E.P.," NY Creates (NY Creates, 2023), <https://ny-creates.org/vetstep/>.

¹⁷⁶ "Workforce Services," The Ohio Manufacturers' Association (The Ohio Manufacturers Association, 2023), <https://www.ohiomfg.com/workforce-services/>.

¹⁷⁷ OhioTechNet (Ohio TechNet, 2018), <https://ohiotechnet.org/>.

- [Career portal](#) – a robust website to help students and job seekers explore industry opportunities
- [SEMI Mentoring](#) – online, on-demand mentoring that connects college students with industry professionals
- [Industry Image and Awareness Campaign](#) – Initiatives aimed at solving one of the largest industry challenges in workforce development
- [Diversity, equity, and inclusion \(DEI\) resources](#) including a roadmap and toolkit, trainings, and support
- [SEMI University](#) – online learning platform with over 360 courses created for the industry, providing online semiconductor training program for employees ranging from recently hired facility operators to experienced technicians, engineers and non-technical staff
- Events, webinars, research, and events that support workforce development and DEI thought leadership and industry perspectives

In addition to these packages, the SEMI Foundation is also developing larger-scale apprenticeship, pre-apprenticeship, and other earn-and-learn programs. In addition, companies and coalitions have access to SEMI University, a new global program offering innovative and leading-edge global educational and training solutions.¹⁷⁸

Semiconductor-Nanotechnology Manufacturing Competency Model

The competency model framework for Semiconductor-Nanotechnology Manufacturing¹⁷⁹ was developed through a collaborative effort involving the USDOL Employment and Training Administration (USDOL-ETA) and leading industry organizations. The framework incorporates Tiers 1-4 of the Advanced Manufacturing Competency Model and adds specialized competencies for the Semiconductor-Nanotechnology Manufacturing industry-sector.

ETA worked with the National Institute for Innovation and Technology (NIIT) to create a dynamic version of the Semiconductor-Nanotechnology Competency Model. It identifies competencies needed for success in semiconductor-nanotechnology manufacturing to improve skills transparency and support a deeper workforce pipeline. This developmental version includes the industry-wide Tier 4 competencies from the Advanced Manufacturing Competency Model and the industry-sector competencies proposed for inclusion in Tier 5, which will be supplemented with Critical Work Functions and Technical Content Areas upon completion.

U.S. Department of Labor Apprenticeship.gov Resources—Advanced Manufacturing Registered Apprenticeship Programs

Registered Apprenticeship¹⁸⁰ is an industry-driven, high-quality career pathway where employers can develop and prepare their future workforce, and individuals can obtain paid work experience, receive progressive wage increases, classroom instruction, and a portable, nationally recognized credential. Registered Apprenticeships are industry-vetted and approved and validated by the U.S. Department of Labor or a State Apprenticeship Agency.

Registered Apprenticeship Programs enable and energize more employers to participate and provide them access to larger talent pools that have been trained for entry-level to management

¹⁷⁸ “SEMI Foundation Mission & Vision,” SEMI Foundation (SEMI, 2023), <http://semifoundation.org>.

¹⁷⁹ “Semiconductor-Nanotechnology Manufacturing Competency Model,” Competency Model Clearinghouse (U.S. Department of Labor, Employment and Training Administration, CareerOneStop, 2023), <https://stage.careeronestop.org/CompetencyModel/competency-models/semiconductor-nanotechnology.aspx>.

¹⁸⁰ “Registered Apprenticeship Program,” Apprenticeship USA (U.S. Department of Labor, Apprenticeship USA, 2023), <https://www.apprenticeship.gov/employers/registered-apprenticeship-program>.

positions, thereby meeting industry demands building pipelines of skilled workers across the country.

Key elements of all Registered Apprenticeship programs include the following:

- **Industry Led** - Programs are industry-vetted and approved to ensure alignment with industry standards and that apprentices are trained for highly skilled, high-demand occupations.
- **Paid Job** - Apprenticeships are jobs that allow workers to earn progressive wages as their skills and productivity increase.
- **Structured On-the-Job Learning/Mentorship** - Programs provide structured on-the-job training to prepare for a successful career, which includes instruction from an experienced mentor.
- **Supplemental Education** - Apprentices are provided supplemental classroom education based on the employers unique training needs to ensure quality and success.
- **Diversity** - Programs are designed to reflect the communities in which they operate through strong non-discrimination, anti-harassment, and recruitment practices to ensure access, equity, and inclusion.
- **Quality & Safety** - Apprentices are afforded worker protections while receiving rigorous training to equip them with the skills they need to succeed and the proper training and supervision they need to be safe.
- **Credentials** - Apprentices earn a portable, nationally recognized credential within their industry.

Registered Apprenticeships provide additional benefits to employers. For example, in many states, businesses can qualify for tax credits. Businesses can also access additional resources, funding, and technical assistance. Since January 2021, the Biden-Harris Administration has invested over \$330 million through grants, contracts, and cooperative agreements to states, employers, labor organizations, and Registered Apprenticeship intermediaries to expand and diversify Registered Apprenticeships, particularly in high-demand fields.¹⁸¹

The Apprenticeship.gov website offers Registered Apprenticeship resources for employers, career seekers, and education partners. The Employers' section of the website includes guidance on how to build or join a program, find partners in an industry or geographic area, and use Registered Apprenticeship to build a diverse, inclusive, and accessible workforce.¹⁸²

Specific information on advanced manufacturing Registered Apprenticeship programs and high-demand occupations can be found on the advanced manufacturing landing page.¹⁸³

Apprenticeship.gov also allows users to contact Registered Apprenticeship experts in the U.S. Department of Labor's Office of Apprenticeship and State Apprenticeship Agencies for assistance.¹⁸⁴

¹⁸¹ For information on funding opportunities, see: "What Funding is Available to Support Apprenticeship Program Creation or Expansion?," Apprenticeship USA (U.S. Department of Labor, Apprenticeship USA, 2023), <https://www.apprenticeship.gov/help/what-funding-available-support-apprenticeship-program-creation-or-expansion>.

¹⁸² "Registered Apprenticeship Program," Apprenticeship USA (U.S. Department of Labor, Apprenticeship USA, 2023), <https://www.apprenticeship.gov/employers/registered-apprenticeship-program>.

¹⁸³ "Advanced Manufacturing," Apprenticeship USA (U.S. Department of Labor, Apprenticeship USA, 2023), <https://www.apprenticeship.gov/apprenticeship-industries/advanced-manufacturing>.

¹⁸⁴ "Top Questions," Apprenticeship USA (U.S. Department of Labor, Apprenticeship USA, 2023), <https://www.apprenticeship.gov/help>.

College and University Programs

Many colleges and universities have specialized programs for semiconductor technologies with more expected as CHIPS investments are implemented. Some organizations have also formed consortia to tackle common challenges together. Workforce development is frequently a focus of these programs. This list is a sampling of current programs to serve as resources for information and potential collaboration.

Arizona State University

Arizona State University (ASU) has recently made significant investments in its microelectronics laboratories in cooperation with industry partners. ASU has additionally committed to providing customizable and scalable online course options in specific areas of expertise like semiconductor packaging or industrial automation to support industry's needs in the face of technological change. ASU also works with industry partners to develop customized workforce development programs that respond to market demand.¹⁸⁵

The Secure, Trusted, and Assured Microelectronics (STAM) Center conducts fundamental research in three technical areas meant to establish the foundation for future secure and trusted semiconductor/ microelectronics technologies: (1) new substrates, synthesis, and fabrication; (2) new computing paradigms and architectures; and (3) integrated sensing, edge computing, and secure communications.¹⁸⁶

The ASU MacroTechnology Works is accelerating semiconductor, advanced materials, and energy device research in the United States. ASU's MacroTechnology Works offers capabilities that are an order of magnitude larger than those available at other universities. Core Research Facilities for Advanced Electronics and Photonics as well as Solar Fabrication provide comprehensive, industry-compatible resources to securely prototype, test and produce vital new technologies.¹⁸⁷

Center for Heterogeneous Integration and Performance Scaling – UCLA

The UCLA Center for Heterogeneous Integration and Performance Scaling (UCLA CHIPS) was established in 2015, at the Samueli School of Engineering, to address the dramatic changes taking place in the electronic hardware arena. The immense cost of semiconductor development and manufacturing, together with the saturation in cost-power-performance metrics, has led to a consolidation of semiconductor fabrication into mega foundries. Even more far-reaching is a similar consolidation in the chip-design area. Computing paradigms are evolving as systems become more data centric and heterogeneous. This calls for a fundamental re-thinking of integrated circuits and system design and manufacture. UCLA CHIPS is an interdisciplinary university-led consortium composed of industrial partners and consortia, universities and government agencies to address this problem holistically. Starting from the application space, the design environment, and the integration scheme, appropriate new materials and components are being developed. These include energy sources, memory, sensors, passives,

¹⁸⁵ "Building the microelectronics workforce of the future," Arizona State University (Arizona Board of Regents, 2022), <https://microelectronics.asu.edu/workforce-development/>.

¹⁸⁶ "STAM Center," Arizona State University (Arizona Board of Regents, 2022), <https://stamcenter.asu.edu/>.

¹⁸⁷ "MacroTechnology Works, Forging the future of materials technology and manufacturing," Arizona State University Ira A. Fulton Schools of Engineering (Arizona Board of Regents, 2022), <https://engineering.asu.edu/macrotechnology-works/>.

electromechanical and medical devices—all of which need to be integrated into these new platforms and application space.

Columbus State Community College

An example of a new dual approach to recruiting and preparing non-degreed workers for semiconductor manufacturing jobs is being spearheaded by the local community college and workforce boards. Columbus State Community College (CSCC) is leading the development of a novel statewide strategy to tackle the new facility's workforce demands and fill approximately 2,000 non-degreed jobs (not including Intel's suppliers, which will also be generating new positions).¹⁸⁸ At the same time, the local workforce board is sharpening its intermediary role as a convener of training organizations and scaling up a “no wrong door” philosophy that enables greater access to the training pipeline for all workers.¹⁸⁹

Lorain County Community College

Lorain Community College will lead a collaboration of 10 colleges and universities with support from Intel to prepare a semiconductor workforce for Intel's planned plant in New Albany, Ohio. Lorain County Community College was chosen to lead this consortium as they provide a variety of programs in microelectronics and automation with a focus on learn and earn education. This consortium was built out of the existing Ohio TechNet program aimed to develop a strong manufacturing workforce in Ohio. Lorain County Community College will also join 11 other midwestern colleges and universities in the formation of a new Midwest Regional Network to Address National Needs in Semiconductor and Microelectronics.¹⁹⁰

Maricopa Community Colleges – Semiconductor Technician Quick Start Program

The Semiconductor Technician Quick Start program was developed by Maricopa Community Colleges in partnership with semiconductor employers. The program is a 10-day technical education program intended to prepare potential technicians for hire by businesses. The program exposes participants to working in semiconductor clean rooms and bunny suits, introduces them to the equipment in the facilities, and prepares them to take the NIMS Technician Certification test. Upon passing, students are eligible to receive a stipend to cover the cost of training and interview with semiconductor companies.¹⁹¹

Midwest Regional Network

Midwest colleges and universities are teaming up to develop innovative solutions to best support the onshoring of the advanced semiconductor and microelectronics industry and address the industries' research and workforce needs. As of January 2, 2023, 20

¹⁸⁸ “Engineering, Manufacturing, and Engineering Technology,” Columbus State Community College (Columbus State Community College, 2018-2020), <https://www.cscce.edu/#ENGINEERING>.

¹⁸⁹ Mark Muro, Lavea Brachman, and Yang You, “With High-Tech Manufacturing Plants Promising Good Jobs in Ohio, Workforce Developers Race to Get Ready,” Brookings (January 24, 2023), <https://www.brookings.edu/research/with-high-tech-manufacturing-plants-promising-good-jobs-in-ohio-workforce-developers-race-to-get-ready/>.

¹⁹⁰ “Lorain County Community College receives Intel award to fuel Ohio's semiconductor workforce,” Lorain County Community College (Lorain County Community College, September 9, 2022), <https://www.lorainccc.edu/newsroom/lorain-county-community-college-receives-intel-award-to-fuel-ohios-semiconductor-workforce/>.

¹⁹¹ “What is the Semiconductor Industry,” Maricopa Community Colleges (The Maricopa County Community College District, 2023), <http://info.maricopacorporate.com/semiconductor>.

institutions have joined the Midwest Regional Network. The goal is to pool resources and collaboratively improve the quality of the semiconductor workforce.¹⁹²

Morgan State University

Morgan State University is an HBCU with high research activity that provides several degrees customized to the microelectronics industry, including research and degree programs in secure embedded systems and assured microelectronics.¹⁹³

Oregon State University

Oregon State University houses and participates in several collaborative efforts with university and industry partners to drive faculty research in semiconductors including the Advanced Technology and Manufacturing Institute and Center for Design of Analog-Digital Integrated Circuits. Oregon State University collaborates with the University of Washington to support the Northwest Nanotechnology Infrastructure site, a part of the NSF's National Nanotechnology Coordinated Infrastructure office.¹⁹⁴

Pennsylvania State University

The Center for Nanotechnology Education and Utilization provides interdisciplinary degree programs, coursework, and resources on nanotechnology manufacturing, including a Nanofabrication Manufacturing Technology Capstone Semester that can be used by students from other universities or industry workers.¹⁹⁵

Purdue University

Purdue University participates in many avenues of education and workforce development for the semiconductor industry. In addition to providing degrees and credentials specific to semiconductor technologies, Purdue has developed a variety of online learning tools for the semiconductor workers including nanoHub and vFabLab. The Purdue Summer Training, Awareness, and Readiness for Semiconductors (STARS) is an eight-week program that will be offered in summer 2023 for the first time to develop deep-tech skills like IC design, fabrication, and packaging, and semiconductor device and materials characterization.¹⁹⁶ The Birck Nanotechnology Center is a state-of-the-art research facility at Purdue University which allows prototype fabrication and characterization at scale.¹⁹⁷ Purdue also leads the SCALE program funded by the Department of Defense which aims to train highly skilled U.S. microelectronics engineers, hardware designers, and manufacturing experts.¹⁹⁸

¹⁹² Zeta Cross, "Illinois Tech join the Midwest Semiconductor Network," The Center Square (Franklin News Foundation, 2023), https://www.thecentersquare.com/illinois/illinois-tech-joins-the-midwest-semiconductor-network/article_757d79e4-8797-11ed-9706-63bf1989bc3d.html.

¹⁹³ "Electrical & Computer Engineering," Morgan State University (Morgan State University 2023), <https://www.morgan.edu/soe/ece>.

¹⁹⁴ "Semiconductor Innovation at Oregon State," Oregon State University (Oregon State University, 2023), <https://engineering.oregonstate.edu/research/semiconductor>.

¹⁹⁵ "Center for Nanotechnology Education and Utilization," Penn State College of Engineering (The Pennsylvania State University, 2022), <https://www.cneu.psu.edu/>.

¹⁹⁶ "How to Start Your Journey Towards a Purdue Semiconductor Credential," Purdue University (Purdue University, 2023), <https://engineering.purdue.edu/semiconductors/student-opportunities>.

¹⁹⁷ "Birck Nanotechnology Center," Purdue University, <https://www.purdue.edu/discoverypark/birck/>.

¹⁹⁸ "Semiconductors @ Purdue," Purdue University (Purdue University, 2023), <https://engineering.purdue.edu/semiconductors/semiconductors-at-purdue>.

The State University of New York (SUNY)

The State University of New York is a university system consisting of 64 institutions, providing a host of programs from technical credential and associate's programs to doctoral programs. The SUNY network has a portfolio of programs specifically directed at the semiconductor industry, including a Semiconductor Manufacturing Technology Associate's Degree from Mohawk Valley and Hudson Valley Community Colleges, Certificates and Associate's Degrees in Advanced Manufacturing from Hudson Valley and Cayuga Community Colleges, and a Bachelor's Degree in Nanoscale Engineering from SUNY Polytechnic Institute. SUNY Polytechnic Institute additionally participates in a variety of coalitions and centers focused on advanced semiconductor research in collaboration with other university and industry partners.¹⁹⁹

Olin College of Engineering

Olin College of Engineering established a Society of Women Engineers to stimulate women to achieve full potential in careers as engineers and leaders, expand the image of the engineering profession as a positive force in improving the quality of life, and demonstrate the value of diversity.²⁰⁰ About half of the college's student body identifies as female while women make up only about 18 percent of the engineering workforce in the United States.²⁰¹

University of Texas at Austin

The University of Texas at Austin (UT Austin) is home to the Chandra Department of Electrical and Computer Engineering, the largest department in the university's Cockrell School of Engineering. Besides offering both undergraduate and graduate level opportunities, it is the home of the Semiconductor Power Electronics Center (SPEC). SPEC at UT Austin educates and trains students; designs, builds, and tests first-of-a-kind devices and systems; provides a world class facility accessible to industry; offers technology transfer to industry through spinout companies; provides advice to the government; and educates the public through demonstrations and pilot projects. Industry supports SPEC by providing fellowship opportunities, sponsoring contract research, and engaging in joint proposals to government.²⁰²

¹⁹⁹ "Degrees and Training for Careers in the Growing Semiconductor Industry," The State University of New York (SUNY, 2023), <https://www.suny.edu/semiconductor/>.

²⁰⁰ "Society of Women Engineers," Olin College of Engineering (Olin College of Engineering, 2023), <http://olincollege.swe.org/>.

²⁰¹ "A Boost for Women Students through Clare Boothe Luce Funding," Olin College of Engineering, (Olin College of Engineering, July 21, 2022), <https://www.olin.edu/articles/boost-women-students-through-clare-boothe-luce-funding>.

²⁰² "Texas ECE – Electrical & Computer Engineering at UT Austin," University of Texas at Austin (University of Texas at Austin, n.d.), <https://www.ece.utexas.edu/>; "Semiconductor Power and Electronics Center," University of Texas at Austin (University of Texas at Austin), <http://spec.ece.utexas.edu/>.

A.4 Child Care for Construction Workers: Case Studies

Care That Works. A non-standard hour child care pilot program in Boston, MA, Care That Works, is a coalition of community groups and labor unions. Care That Works matches working parents pursuing careers in construction and hospitality with child care providers who open as early as 5:00 a.m. The program provides child care for workers and supports participating child care providers with a stipend, helping to ensure high quality child care. The funding for this vital support service comes from project labor agreements for major construction projects in the Boston area and recently received additional funding through the city of Boston using American Rescue Plan Act (ARPA) funds.²⁰³

TradesFutures. The goal of TradesFutures pilots launched in New York City and Milwaukee is to provide construction workers with access to quality, affordable child care.²⁰⁴ Both pilots will support a local child care coalition comprised of labor unions and nonprofits and will connect women with quality child care.²⁰⁵

Moore Community House. Based in Biloxi, Mississippi, Moore Community House offers funding for child care as part of its Women in Construction (WinC) program. The program helps create economic security for women by offering affordable child care and job training for work that pays a living wage. The WinC Program is a pre-apprenticeship job training program designed to prepare women for careers in apprenticeship and nontraditional career pathways. As part of the program, Moore Community House offers child care assistance for eligible participants in two ways: they either provide child care directly through their Early Head Start program or they help connect WinC participants with a child care provider and provide a stipend for this care.²⁰⁶

Oregon Trades Programs. State, local, and community stakeholders have launched several initiatives in Oregon to expand access to child care for construction workers. The Apprentice-Related Child Care (ARCC) program provides subsidies to apprentices as part of their training, allowing family and friends become eligible providers and receive payment for child care services.²⁰⁷ Evidence suggests that ARCC's subsidies have increased apprenticeship training completion rates by more than 20 percent. In addition, as a means of creating a more stable supply of child care, Labor Littles (a nonprofit organization) reserved slots with extended hours care providers to ensure availability for construction workers. To de-risk the arrangement for providers, Labor Littles reimbursed providers for any slots that went unfilled. Such an

²⁰³ "We're Fighting for Child Care that Works for Working Families," Care That Works (Care that Works, June 24, 2022), <https://carethatworks.org/>.

²⁰⁴ "Child Care Pilots, TradesFutures Child Care Pilot Program: Working to Make Child Care Accessible for North America's Skilled Tradespeople," TradesFutures (TradeFutures, August 8, 2022), <https://tradesfutures.org/initiatives/child-care-pilot/>.

²⁰⁵ "Hard Hats. Strong Women. Building the Future." Nontraditional Employment for Women, (Nontraditional Employment for Women, 2023) <https://www.new-nyc.org/>.

²⁰⁶ "Building Stronger Communities Since 1924," Moore Community House (Moore Community House, 2021), <https://www.moorecommunityhouse.org/>.

²⁰⁷ Rebecca Gale, "How Child Care in Oregon is Saving the Construction Trade," Early Learning Nation (Early Learning Nation, January 30, 2023), <https://earlylearningnation.com/2023/01/how-child-care-in-oregon-is-saving-the-construction-trade/>.

arrangement—which drew support from unions, providers, and public financing—represents a model by which employers can shape markets to meet their workers’ needs.²⁰⁸

²⁰⁸ “Child Care Supports For The Construction Trades: Building and Sustaining Diversity in Oregon,” Institute for Women’s Policy Research (Institute for Women’s Policy Research, 2020), <https://policygroupontradeswomen.org/wp-content/uploads/2021/12/IWPR-Oregon-Child-Care-in-Construction-2020-Final.pdf>.

A.5 Federal Labor and Employment Laws

Federal labor and employment laws are legal requirements that apply to all employers in the United States. They mandate minimum safety, wage, anti-discrimination, and other workplace standards for all businesses in the United States. Applicants should also be aware of broadly applicable federal labor and employment laws such as federal fair labor practices, civil rights, and nondiscrimination, and prepare to evaluate subgrantees on their adherence. Applicants must abide by all applicable Federal laws, executive orders, regulations and policies governing this program. This section intends to detail relevant federal law for CHIPS projects; however, states, territories, and Tribal Entities may have additional applicable labor and employment requirements to which applicants and subgrantees alike must adhere.²⁰⁹

Act	Summary
Fair Labor Practices	
Fair Labor Standards Act	Establishment of minimum wage, overtime pay, recordkeeping, and child labor standards affecting full-time and part-time workers across private and public sectors
Occupational Safety and Health Act	Establishment of safe and healthy workplace standards
Service Contract Act	Establishment of standards for contractors and subcontractors performing services on prime contracts in excess of 2,500
Civil Rights and Nondiscrimination	
Title VI of the Civil Rights Act of 1964 (See also 15 C.F.R. Part 8)	Prohibition on discrimination on the basis of race, color, or national origin under programs or activities receiving federal financial assistance, including from the Department of Commerce
Title IX of the Education Amendments of 1972	Prohibition of discrimination on the basis of sex under federally assisted education programs or activities
The Americans with Disabilities Act of 1990	Prohibition of discrimination on the basis of disability under programs, activities, and services provided or made available by Eligible Entities and local governments or instrumentalities or agencies thereto, as well as public or private entities that provide transportation
Section 503 of the Rehabilitation Act of 1973	Prohibits federal contractors and subcontractors from discriminating in employment against individuals with disabilities and requires employers take affirmative action to recruit, hire, promote, and retain these individuals

²⁰⁹ Tribal Entities may have a Tribal Employment Rights Office (TERO) that monitors and enforces Tribal employment rights and ordinances and facilitates the employment of American Indians and Alaska Natives in businesses and industries operating within the geographical boundaries of the reservation. For more on TERO and Tribal Entity labor and employment law, see “Indian and Native American Employment Rights Program,” Office of Federal Contract Compliance Programs, (U.S. Department of Labor, Office of Federal Contract Compliance Programs, 2023), https://www.dol.gov/sites/dolgov/files/ofccp/INAERP/files/INAERP_ESQA508c.pdf; “Frequently Asked Questions About Indian Tribes and Tribal Employment Rights Offices,” Equal Employment Opportunity Commission (2023), <https://www.eeoc.gov/frequently-asked-questions-about-indian-tribes-and-tribal-employment-rights-offices>; “Indian Preference FAQs,” Office of Federal Contract Compliance Programs (U.S. Department of Labor, Office of Federal Contract Compliance Programs, 2023), www.dol.gov/agencies/ofccp/faqs/indian-preference.

Section 504 of the Rehabilitation Act of 1973	Prohibition of discrimination on the basis of handicap under any program or activity receiving or benefiting from federal assistance
The Age Discrimination Act of 1975	Prohibition of discrimination on the basis of age in programs or activities receiving federal financial assistance
Executive Order 11246	Requires affirmative action and prohibits federal contractors from discriminating on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin. Contractors also are prohibited from discriminating against applicants or employees because they inquire about, discuss, or disclose their compensation or that of others, subject to certain limitations.
Vietnam Era Veterans' Readjustment Assistance Act (VEVRAA)	Prohibits federal contractors and subcontractors from discriminating in employment against protected veterans and requires employers take affirmative action to recruit, hire, promote, and retain these individuals.
Additional Authorities	
Parts II and III of Executive Order 11246, Equal Employment Opportunity	Requires that federally assisted construction contracts incorporate and fulfill the nondiscrimination provisions of §§ 202 and 203 of E.O. 11246 and Department of Labor regulations implementing E.O. 11246 (41 C.F.R. § 60-1.4(b))
Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency	Requires federal agencies to examine the services that they provide, identify any need for services to those with limited English proficiency (LEP), and develop and implement a system to provide those services so LEP persons can have meaningful access to them
Executive Order 13798, Promoting Free Speech and Religious Liberty (see also OMB M-20-09 Guidance Regarding Federal Grants and Executive Order 13798)	States or other public grantees may not condition sub-awards of federal grant money in a manner that would disadvantage grant applicants based on their religious character

A.6 Additional Workforce Planning Resources

Applicants may consider using the following resources to better understand the guidance provided in this planning guide.

A.6.1 American Job Centers

The public workforce system provides central points of services for job listings, training referrals, and other supports for employers and workers through its system of more than 2,400 [American Job Centers \(AJCs\) nationwide](#). [State and local workforce development](#) boards coordinate employment and training activities funded through the Workforce Innovation and Opportunity Act (WIOA) through AJCs. AJCs are also access points for WIOA partner programs, including adult education, career and technical education, vocational rehabilitation, and veterans' employment programs. [CareerOneStop.org](#) provides a wide range of resources on the public workforce system including a listing of state and local [workforce development boards](#), a [community college finder](#), and a [toolkit](#) with a variety of resources, as well as many other resources.

A.6.2 U.S. Department of Housing and Urban Development—Community & Supportive Services Programs

The Mission of the Community and Supportive Services (CSS) Program is to support the work of partners and public housing authorities in reducing barriers and improving access to opportunities for communities, families, and residents to improve their quality of life.

There are three specific programs related to increasing employment and wages for households receiving federal housing assistance:

- **Resident Opportunity Self-Sufficiency Program.** Enables HUD-assisted residents to make progress towards self-sufficiency by removing the educational, professional, employment, and health barriers they face.
- **Family Self-Sufficiency Program.** Provides motivational coaching to increase household earned income and achieve self-sufficiency through the following: comprehensive case management services; partnerships for services, supports and resources; and via family escrow accounts that grows as a family's earnings grow.
- **Jobs Plus.** Jobs Plus is a place-based, evidence-based program that aims to increase earnings and advance employment outcomes for public housing residents. The program develops locally-based, job-driven approaches to achieve objectives. Jobs Plus addresses poverty among public housing residents by incentivizing and enabling employment through an earned income disregard, and services designed to support work including employer linkages, job placement and counseling, educational advancement, and financial counseling. Lastly, the program saturates sites with services and incentives, building a culture of work and making working families the norm.

A.6.3 Other Public Resources

Resource	Source	Description
<i>Federal Labor and Employment Laws</i>		
Handy Reference Guide to the Fair Labor Standards Act	DOL	Reference guide to sections of the Fair Labor Standards Act.
Prohibited Employment Policies/Practices	U.S. Equal Employment Opportunity Commission (EEOC)	Explanations and additional information on prohibited employment policies and practices per the laws enforced by HIS.
At A Glance	DOL Office of Federal Contract Compliance Programs (OFCCP)	Explanation of role of OFCCP and enforcement of equal employment opportunity and nondiscrimination requirements of federal contractors.
Job Accommodation Network	DOL	Resources about the ADA and strategies to accommodate employees with disabilities. The Job Accommodation Network also offers consulting services for organizations with questions.
<i>Equitable Training and Workforce Development</i>		
Diversity and Inclusion	DOL	Guidance and resources for fostering a diverse and inclusive workplace.
Diversity, Equity, Inclusion, and Accessibility	DOL	Information on how including diversity, equity, inclusion, and accessibility in Registered Apprenticeships is beneficial, along with case studies.
Build Together: Diversity, Equity & Inclusion in Construction	National Center for Construction Education & Research	Key takeaways and examples of how construction companies can implement DEI initiatives and improve workplace inclusion for their employees.
SkillSPAN	National Skills Coalition	A national network of non-partisan coalitions focused on advancing state skills policies to expand economic opportunities for workers while boosting local workforce capacity.
Designing Inclusive Apprenticeships	Partnership on Inclusive Apprenticeship	A guide to recruiting and training apprentices with disabilities.
USDA Resource Guide for Rural Workforce Development	U.S. Department of Agriculture (USDA)	Outlines programs and services available at USDA and other federal departments/agencies to support rural workforce development.
Explore Pre-Apprenticeships	DOL	Resource to support the development of high-quality apprenticeship and pre-apprenticeship programs, including case studies and examples.

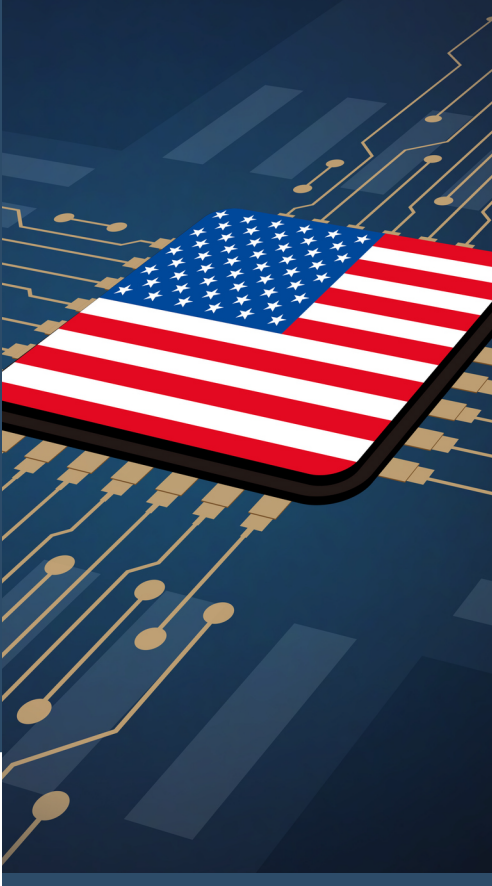
Prevailing Wage Information and Resources	DOL	A guide with information, tools, and additional resources specifically related to prevailing wage.
Labor-Management Relations	DOC	An explanation of labor-management relations and best practices.
Construction Program Guide: Project Labor Agreement	DOT	Provides a description of Project Labor Agreements (PLAs) and relevant Executive Orders and legislation.
Labor Peace Agreements	U.S. Chamber of Commerce	Describes a Labor Peace Agreement and provides multiple case studies of successful Labor Peace Ordinances.
Family Self-Sufficiency (FSS)	HUD	Promotes the development of local strategies to coordinate public and private resources that help housing choice voucher program participants, public housing tenants, and tenants in the Section 8 Project-Based Rental Assistance program obtain employment that will enable participating families to achieve economic independence and reduce dependence on welfare assistance and rental subsidies.
Resident Opportunity and Self Sufficiency (ROSS)	HUD	The purpose of the ROSS Service Coordinator program is to provide funding to hire and maintain Service Coordinators who will assess the needs of residents of conventional Public Housing or Indian housing and coordinate available resources in the community to meet those needs.
Section 3	HUD	The Section 3 program requires that recipients of certain HUD financial assistance, to the greatest extent possible, provide training, employment, contracting and other economic opportunities to low- and very low-income persons, especially recipients of government assistance for housing, and to businesses that provide economic opportunities to low- and very low-income persons.
Contracting		
An Overview of Small Business Contracting	Congressional Research Service	Descriptions of federal small business designations, example federal funding programs for small businesses, and related requirements.
MBDA Programs/Business Centers	DOC	A list of Minority Business Development Agency (MBDA) programs and business centers across the country by state.
Contracting Guide	SBA	A list of state and local SBA offices, which can offer support for connecting with small businesses.

A.6.4 Resources for Understanding the Workforce Landscape

The workforce landscape analysis should include a thorough scan of workforce laws and regulations in the state, territory, or tribal community; employment and workforce demographic data; and potential collaborators on workforce initiatives. Use the guiding questions and resources below to help support a landscape analysis.

Guiding Questions	Resources
Laws and Regulations	
- What are the laws and regulations that govern labor and workforce in your state, territory, or tribal community? - How do these laws and regulations relate to contracting and subcontracting? - Are there any workforce laws or regulations currently under consideration?	State Workplace Safety and Health Program Plans (OSHA) State Labor Laws (DOL)
Labor Market	
- What are the dominant industries and occupations in the labor market in your state, territory, or tribal community? - What are occupations likely to be required in the semiconductor labor market? What are other industries that currently rely on these roles within your region? - What are the unemployment and underemployment rates? - What are five-year trends for employment in each occupation? - What are the leading barriers to employment in the semiconductor labor market? - What are the prevailing wages for semiconductor workforce jobs? - How do these compare to other jobs in the workforce? - How do these compare to regional and national wages for each occupation? - What is the variation in these trends across your state, territory, or tribal community?	Unemployment Rate by State (DOL) Prevailing Wage Resources (National Conference of State Legislatures) O*NET OnLine Occupational Information (O*NET) Longitudinal Employer-Household Dynamics (Census)
Workforce Demographics	
- Who are the workers in your state, territory, or tribal community? What are their characteristics (e.g., age, gender, ethnicity, race)? - What groups are underrepresented in the workforce? Why are they underrepresented? - What recruitment pipelines and workforce retention programs exist to promote a diverse and skilled workforce?	Workforce Data by State (DOL) State Employment Statistics (Bureau of Labor Statistics) Worker characteristics (Bureau of Labor Statistics) Burning Glass Data (Emsi)

	State Labor Market Information Contact List (Bureau of Labor Statistics) State Labor Market Information Contact List (Bureau of Labor Statistics)
Potential Collaborators	
• Who are current partner groups (e.g., governmental offices and programs, unions and labor organizations, non-profits, educational institutions) involved in workforce in your state, territory, or tribal community? • How are these various partners engaged? • What are potential opportunities for your workforce team to collaborate with these partners groups? • Who are new businesses, industries, and other potential collaborators to engage in workforce planning? • Are these groups trusted among the communities where these jobs will be placed? • What process will you use when conflict arises among contributors?	National Association of State Workforce Board Chairs (NGA) Workforce Development Technical Assistance Program (NGA) National Association of State Workforce Agencies (NASWA) National Association of Workforce Boards America Achieves



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