Pathways to Commercial Liftoff: Overview of Societal Considerations and Impacts

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Comments

The Department of Energy welcomes input and feedback on the contents of this Pathway to Commercial Liftoff. Please direct all inquiries and input to liftoff@hq.doe.gov. Input and feedback should not include business sensitive information, trade secrets, proprietary, or otherwise confidential information. Please note that input and feedback provided is subject to the Freedom of Information Act.

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1. Societal Considerations and Impacts

How first-of-a-kind energy infrastructure projects impact—and are impacted by—society can determine market liftoff. Individual projects introduce far-reaching, multi-generational changes to local communities, while also setting the standard for follow-on projects unfolding across the country. In this way, social considerations and impacts not only influence the success of each individual project, but ultimately determine social acceptance and adoption. As first movers, early players have an outsized role in shaping whether the clean energy transition is supported by, and supportive of, communities and workers across the country: new technologies can contribute to a more equitable and just future, or follow entrenched patterns of racial and socio-economic injustice in the U.S. energy and industrial systems.[1] With much of the country's existing energy and industrial infrastructure located in communities of color, tribal communities, and working-class communities,[2] energy production and use has historically posed outsized health, environmental, and social risk to these communities, while creating a complicated economic legacy.[3,4,5,6] The pollution and health risks associated with some energies[7,8] have falsely been cast, by some corporations, politicians, and industry interest groups,[9] and benefits to local economies,[10] including tax revenues that can support critical investments in roads, health care, libraries,[11] schools. However, these benefits can be undercut by other economic and safety risks if long-term community well-being is.[12,13,14,15,16,17] And while some energy sector salaries, including for oil and gas[18] are higher on average than the annual mean wage in the U.S.,[19] Black, African American, and Latinx workers are underrepresented in the energy sector overall and are less likely to hold high-paying jobs with benefits. Recognizing the potential impact of energy infrastructure, clean energy entrepreneurs can choose to pursue future energy development that proactively supports host communities, uplifts the workforce, takes steps to mitigate possible harms, and responds to the legacy of the U.S. energy system.

1   Decarbonization and Its Discontents: A Critical Energy Justice Perspective on Four Low-Carbon Transitions by Benjamin K. Sovacool, Mari Martiskainen, Andrew Hook, Dr. Lucy Baker :: SSRN
2   https://globaljusticeecology.org/environmental-burdens-of-fracking-placed-on-communities-of-color-low-income/#:~:text=Communities%20of%20color%20were%20substantially%20more%20likely%20to,power%20plant%20%28vs.%209%25%20of%20mostly%20white%20areas.%29
3   https://www.epa.gov/airmarkets/power-plants-and-neighboring-communities
4   PM2.5 polluters disproportionately and systemically affect people of color in the United States - PubMed (nih.gov)
5   [PDF] A measurement strategy to address disparities across household energy burdens | Semantic Scholar
6   For The Navajo Nation, Uranium Mining's Deadly Legacy Lingers : Shots - Health News : NPR
7   Climate Justice and California's Methane Superemitters: Environmental Equity Assessment of Community Proximity and Exposure Intensity - PubMed (nih.gov)
8   Pollution from Fossil-Fuel Combustion is the Leading Environmental Threat to Global Pediatric Health and Equity: Solutions Exist | Academic Commons (columbia.edu)
9   Drilling Is Just the Beginning: Romanticizing Rust Belt identities in the campaign for shale gas: Environmental Communication: Vol 10, No 3 (tandfonline.com)
10   The Localized Health Impacts of Fossil Fuels - Climate Nexus
11   https://www.kxnet.com/news/state-news/2022-oil-and-gas-tax-study-shows-billions-in-revenue-for-north-dakota/#:~:text=Oil and gas tax revenue also provides funding, have just been the production and extraction tax.
12   The toxic land: sacrificing health for wealth - The Lancet Respiratory Medicine
13   https://media.rff.org/documents/WP_21-36.pdf?_ga=2.219906142.614716199.1672451229-222215140.1665753080&_gl=1*1bp4vz9*_ga*MjIyMjE1MTQwLjE2NjU3NTMwODA.*_ga_HNHQWYFDLZ*MTY3MjQ1MTIyOC40LjEuMTY3MjQ1Mjg5NC4wLjAuMA..
14   Socioeconomic System of the Oil Boom and Rural Community Development in Western North Dakota - Fernando - 2016 - Rural Sociology - Wiley Online Library
15   https://media.rff.org/documents/WP_21-36.pdf?_ga=2.219906142.614716199.1672451229-222215140.1665753080&_gl=1*1bp4vz9*_ga*MjIyMjE1MTQwLjE2NjU3NTMwODA.*_ga_HNHQWYFDLZ*MTY3MjQ1MTIyOC40LjEuMTY3MjQ1Mjg5NC4wLjAuMA..
16   https://climatenexus.org/climate-issues/health/the-localized-health-impacts-of-fossil-fuels/
17   Employment and wages in mining industries : The Economics Daily: U.S. Bureau of Labor Statistics (bls.gov)
18   BLS Data Viewer
19   USEER 2022 National Report (energy.gov)

When communities and workers are not involved in decision-making on projects that impact their lives, a lack of community or labor acceptance can pose a real risk to project success. Community- and worker-led pushback, protests, and lawsuits can lead to costly delays, or even cancelations, for projects—this has been seen across technologies including carbon management, nuclear, hydrogen, and renewables.[20,21,22,23] Proactively accounting for societal considerations and impacts can minimize community acceptance risk, project implementation risk, and legal risk, while maximizing opportunities for quality jobs, community benefits, and positive host-community relationships. Addressing energy and environmental justice (EEJ) concerns is also increasingly required by state laws. New Jersey, for example, passed a bill (SB 232)[24] with new permitting requirements for certain facilities—including facilities that are major sources of air pollution—located in the same census tract as overburdened communities.[25] The law requires polluting facilities seeking to develop new projects, expand existing projects, or renew state permits to hold public hearings to gather community input, in addition to undergoing state-level review of all potential environmental and public health impacts.

To proactively account for societal considerations and impacts, project developers should**:**

1.   Meaningfully engage with impacted communities, tribes, and labor unions early and often to support real accountability and transparency;

2.   Assess and address energy and environmental justice concerns and opportunities;

3.   Create quality jobs and invest in career-track workforce development; and

4.   Support diversity, equity, inclusion, and accessibility.

These four considerations and impacts are interrelated: just and equitable outcomes depend on the full and meaningful participation of impacted groups in decisions that affect their lives, and economic benefits should complement social, environmental, and health benefits.[26, 27]

Centering equity, labor rights, and justice in energy and infrastructure investments is especially crucial as what is built and where, how and by whom it is built and maintained, and who has power to influence decisions all are key levers driving the distribution of benefits and burdens. As the clean energy revolution is built project by project, each cutting-edge project will have a ripple effect far beyond the communities in which they are located. **Investors, developers, and project performers, equipped with money, technical expertise, and management experience, have the power to engage in more inclusive and just processes and, in doing so, ensure the success of both individual energy projects and the larger clean energy transition. By engaging seriously with questions of equity, labor rights, and justice, investors, developers, managers, and off-takers can help support the country's equitable energy transition, ensuring a more just distribution of impacts, fostering innovation, protecting and supporting workers, remediating legacy harms, investing in training the next generation, ensuring safe and high-quality workmanship, and limiting damage from climate change for generations to come.**

[20]   Special Report: Rural communities push back against solar - VTDigger
[21]   Wind Farm Pushback — Community Acceptance and Ownership | T&D World (tdworld.com)
[22]   Louisiana parish puts a hold on planned carbon capture projects | IEEFA
[23]   NW Natural withdraws Eugene, Oregon, hydrogen test project - Portland Business Journal (bizjournals.com)
[24]   https://www.njleg.state.nj.us/bill-search/2020/S232
[25]   https://www.ncsl.org/research/environment-and-natural-resources/state-and-federal-efforts-to-advance-environmental-justice.aspx
[26]   Drilling Is Just the Beginning: Romanticizing Rust Belt identities in the campaign for shale gas: Environmental Communication: Vol 10, No 3 (tandfonline.com)
[27]   The Localized Health Impacts of Fossil Fuels - Climate Nexus

1.1 Community and Labor Engagement

"Engagement" differs from communications, as traditionally understood in terms of a developer simply reaching out and providing information, and it goes beyond holding events or listening sessions. Community and labor engagement is about relationship building leading toward partnerships, and it is about building accountability – for example, through the use of Workforce and Community Agreements. Recognizing that not all communities and groups will be equally impacted due to differences in existing burdens, injustices, and vulnerabilities, engagement efforts should proactively identify most impacted and most vulnerable groups and work to fairly represent and account for their views and priorities. This kind of engagement—representative, deliberate, and consequential—begins well before projects break ground, and before sites are selected. It cuts across all project phases, from conception to decommissioning, and evolves throughout the project in response to stakeholder input and needs, which may change over time. See Appendix A for some common steps to engage with impacted groups, as well as some publicly available resources offering guidance on community and labor engagement.

1.1.1 Workforce organizations and labor union engagements

"Engagement" differs from communications, as traditionally understood in terms of a developer simply reaching out and providing information, and it goes beyond holding events or listening sessions. Community and labor engagement is about relationship building leading toward partnerships, and it is about building accountability – for example, through the use of Workforce and Community Agreements.[28] Recognizing that not all communities and groups will be equally impacted due to differences in existing burdens, injustices, and vulnerabilities, engagement efforts should proactively identify most impacted and most vulnerable groups and work to fairly represent and account for their views and priorities.[29] This kind of engagement—representative, deliberate, and consequential—begins well before projects break ground, and before sites are selected. It cuts across all project phases, from conception to decommissioning, and evolves throughout the project in response to stakeholder input and needs, which may change over time. See Appendix A for some common steps to engage with impacted groups, as well as some publicly available resources offering guidance on community and labor engagement. transportation and along the supply chain. It also requires understanding the larger economic impact of the energy transition. As described above, the energy transition has important ramifications for host-community economies, impacting not only local tax revenue but also the local workforce at large, which may experience job loss or displacement.

Working with local Building and Construction Trade Councils, Central Labor Councils, and State Labor Federations—which often exist at the local and/or county level and which may comprise many local unions involved in infrastructure work—can offer a good starting point for identifying and connecting with local union groups. Additionally, some unions have national and local branches. Working with national chapters may help project teams identify and connect with local affiliates. Because there may be several different unions with overlapping trade jurisdictions in a geographic area, contact with only one union for a certain trade may not be best practice. Effective face-to-face engagement may be supported by first understanding the specific missions, priorities, and concerns of each union, which may be represented on union websites and in public statements.

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[28] The term "Workforce and Community Agreement" includes a range of formal agreements between a project developer/owner, impacted community groups, and relevant labor unions that are used in project development and/or execution to ensure that benefits promised to communities and workers are realized. This could be an agreement specifying a project's commitments to the community; it could also be a collective-bargaining agreement specifying wages, benefits, health and safety standards, workforce education and training, and other terms of employment with a labor union; or it could include both community and workforce provisions. This term as used here is inclusive of Community Benefits Agreements, Community Workforce Agreements, Good Neighbor Agreements, Project Labor Agreements, Collective-Bargaining Agreements, and other similar contractual tools. For more, see https://www.energy.gov/clean-energy-infrastructure/community-benefits-plan-frequently-asked-questions
faqs#:~:text=Community%20Benefits%20Plan%20Frequently%20Asked%20Questions%20%28FAQs%29%20What,accompany%20all%20agency%20funding%20opportunity%20announcements%20%28FOAs%29.-related%20projects

[29] Decarbonization and Its Discontents: A Critical Energy Justice Perspective on Four Low-Carbon Transitions by Benjamin K. Sovacool, Mari Martiskainen, Andrew Hook, Dr. Lucy Baker :: SSRN

1.1.2 Tribal Engagement

Consultation on a government-to-government basis is required where tribal interests may be impacted as a result of a federally involved or federally funded project. The federal government holds a trust responsibility with federally recognized tribes[30] that cannot be delegated, and federally recognized tribes have a right to government-to-government consultation with the federal government due to their sovereign status. That said, there are best practices that can be implemented in the early stages of project design before federal involvement.

For projects proposed to be built on tribal trust land, including within a reservation, project developers will be aware of which Tribes to consult. For projects not located on tribal trust land, the first step for developers is to identify the tribes who may hold treaty rights in the project area, have ceded the land where the project is proposed to be located, or consider the project area to have traditional religious, cultural, and/or spiritual importance. As a general rule of thumb, this is best done by approaching the state historic preservation office and any federal land management agencies that have a presence in the area, and who consult with those tribes on a regular basis. Once those tribes have been identified, they can be contacted by the project proponent, but, as described above, it is possible some tribes will not respond to queries from private parties. This decision rests with the tribe in question, must be respected, and should not be taken as either support or lack of interest in the project. Many tribes have limited resources and staffing that they must use strategically and that may limit or prevent them from replying to communication from a private entity.

A good faith effort to communicate with tribes will recognize this and allow for the tribe to respond on their time frame. Any contact with the tribe should be directed to the tribal government and elected leaders and, if relevant, the tribal historic preservation office. The information initially provided to the tribe should be clear and understandable, be accompanied by maps and figures showing where the project would be located and what it might look like and contain a clear 'ask' about any known concerns the tribe may have regarding the project, its siting, and any other issues the tribe might like to raise at this time. The outreach should also make clear that it is not federal government-to-government consultation. This initial outreach could help identify immediate red flag concerns, while also opening the door to collaborative engagement with the involved tribes in a good faith effort to ensure tribal interests and treaty rights are respected and protected. Private entities who engage in outreach with federally recognized tribes for federally funded or federally involved projects should keep their points of contact at the pertinent federal agency updated, including by providing copies of correspondence and summaries of interactions, in order to facilitate subsequent government-to-government consultation conducted by the federal agency later on in connection with compliance with Section 106 of the National Historic Preservation Act and the National Environmental Policy Act.

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[30] For information on the distinction between federally recognized and non-federally recognized tribes, and for more information on consultation with non-federally recognized tribes, see GuidetoWorkingwithNon-FederallyRecognizedTribesintheSection106Process.pdf (achp.gov)

1.1.3 Essential Elements of Engagement

Below are some of the essential elements of engagement, followed by a few examples of guiding questions for project developers to consider for new projects.

Projects should have a clear understanding of the communities they are in.
- Who lives near the project?
- What types of workers are needed and where will they come from?
- What are the current and historical social, cultural, economic, labor, and environmental landscapes and decision-making structures related to the project's affected areas and groups?
- Who are the groups most vulnerable to project impacts?
- Are there underserved and overburdened communities in the surrounding area?
- Are there tribal interests in the surrounding area?
- Does the area already experience environmental, health, or economic impacts from a high concentration of nearby industrial infrastructure?

The unique history of the developer or existing site is critical to project success.
- For projects at existing facilities, what is the relationship like with the community?
- Has the owner, company, or project performer had regulation violations or lawsuits from the community?
- Does the project provide safe, quality jobs to the surrounding community that has positive and equitable social and economic impacts?

Projects should have a robust and detailed implementation plan for meaningful, two-way engagement, and accountability to impacted groups, meaning that the concerns and priorities of impacted groups have opportunities to influence project decisions.
- Do projects have negotiated, enforceable workforce and/or community agreements?
- Is there a pathway for the project to propose multiple sites or consider changing the proposed site based on project learnings?
- Is there community participation in and access to monitoring?
- How is the project including traditionally excluded stakeholders?

Engagement plans should include evaluation methodologies to assess success of engagement.
- Does the host community want the project?
- Has input from the host community or relevant local stakeholders impacted how the project has progressed?

Projects should have transparent and robust plans for monitoring and enforcement.
- Is sufficient safety and monitoring data collected?
- Can communities access data?
- What are the enforcement mechanisms?
- Is there sufficient safety training and notification in case of accidents?
- Where can communities report when there are concerns, and are those reports taken seriously and acted upon?

1.2 Advancing Energy and Environmental Justice

Energy and infrastructure projects may drive ecological, aesthetic, historic, cultural, economic, social, health, and other impacts—both positive and negative, direct and indirect—in host communities and surrounding areas. They may provide benefits in the form of direct or indirect investments or by contributing to energy justice priorities for disadvantaged communities, such as those laid out by DOE: 1) decreased energy burden; 2) decreased environmental exposure and burdens; 3) increased access to low-cost capital; 4) increased high quality job creation, the clean energy job pipeline, and job training for individuals; 5) increased clean energy enterprise creation and contracting (e.g., minority-owned or disadvantaged business enterprises); 6) increased energy democracy, including community ownership; 7) increased parity in clean energy technology access and adoption; and 8) increased energy resilience. Communities may also benefit from tax revenue generated from energy projects, which support crucial services and infrastructure such as schools, health centers, and libraries, and from the follow-on economic development connected to a project, including the growth of ancillary industries that support a central energy hub[32,33]. Projects may negatively impact communities by detracting from these goals, creating industry-dependent economies, or exacerbating cumulative burdens. **Notable impacts anticipated for each technology are discussed in detail in the relevant chapter.**

It is very common for two projects of the same technology to have different impacts depending on the location of the project. Different communities and groups can also experience the same set of impacts differently. Therefore, it is critical that assessment of impacts done on a project-by-project basis *and* that the identification of project impacts meaningfully includes impacted communities and groups. Key components of energy and environmental justice include distributive justice, or fairness and equity in outcomes (asking who experiences the benefits and who experiences the burdens of a project), and procedural justice, or fair and equitable participation in decision-making (asking who has power to make decisions about things that affect one's life)[34]. The principles of energy and environmental justice[35] provide a framework that can guide future energy and infrastructure projects to advance justice, rather than perpetuate injustice.

1.2.1 Who is impacted and cumulative impacts

Siting is often a major determinant of how project burdens are distributed and experienced, as proximity to energy or industrial infrastructure often increases exposure to pollution; safety concerns; land-, energy-, and water-use changes; and impacts to wealth and quality of life. Oil, gas, and chemical facilities are disproportionately sited in communities of color, tribal communities, and low-income communities[36]. As discussed above, the relationship between host communities and fossil fuel facilities is complex, offering the potential to enjoy certain economic benefits while also causing permanent environmental degradation and socio-economic disinvestment[37]. These impacts may vary dramatically from one community to another based on local history and cumulative burdens. In communities experiencing poverty, racism, and/or a lack of social services, impacts from energy infrastructure may interact with and compound existing burdens in significant, and potentially dangerous, ways. In addition to increasing health risks (especially in communities with limited access to health care), the pollution, land use constraints, and cost burden of a new fossil-based energy production site or pipelines in overburdened and under-resourced communities may decrease home values, significantly undercutting local wealth. Appendix B offers publicly available tools to help assess the characteristics of areas and groups impacted by a project, providing information on who is impacted and the burdens they face.

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32   Coal Plant Communities Seek a Just Economic Transition – Institute for Local Self-Reliance (ilsr.org)
33   WINDExchange: Wind Energy Economic Guide
34   Additional pillars of environmental, energy, and climate justice include restorative justice and recognition justice. Restorative justice concerns remediating prior and ongoing harms done to communities and the environment. It recognizes the history of inequitable distribution of harms and historic exclusion from decision-making processes, and that the current baseline for cumulative burdens is different for different communities. Recognition justice concerns respecting and honoring divergent cultural and local knowledge. Recognition-based justice calls for an acknowledgement of who is being affected by energy decision-making and who is responsible for those decisions, and that different communities and individuals have different priorities, needs, concerns, and knowledges.
35   The Environmental Protection Agency defines environmental justice (EJ) as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This goal will be achieved when everyone enjoys: the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work" (www.epa.gov/environmentaljustice/learn-about-environmental-justice).
36   https://www.sierraclub.org/articles/2022/01/hydrogen-future-clean-energy-or-false-solution
37   https://www.propublica.org/article/toxmap-poison-in-the-air

1.2.2 Essential Elements of Energy and Environmental Justice

Below are some of the essential elements of energy and environmental justice, followed by a few examples of guiding questions for project developers to consider for new projects.

Projects should have a detailed assessment of all benefits and negative impacts across the full cycle of production, transportation, storage, use, and decommissioning. This can use or include rigorous LCAs of pollutants and GHGs to ensure projects are actually reducing GHGs and not greenwashing[38].

- What are the potential environmental, social, health, and economic impacts of project inputs and outputs?
- Which geographic areas will be impacted by the project over its lifecycle (including sourcing and supply chain), and how will these areas be impacted?

Each impact should have an associated methodology for measuring, tracking, and reporting, along with associated metrics, and impacted groups should have access to this data.

- How can impacted groups should have access project data (e.g., real-time fence-line monitoring data posted on a publicly available website)?

How can these groups have stronger oversight roles? **Projects should understand where each impact flows.**

- Are overburdened communities going to see an increase or decrease in pollution?
- Who is getting new jobs? What is the quality and longevity of these jobs?
- Does the project contract with minority-, women-, Veteran-owned or other disadvantaged businesses, or work with Minority Serving institutions?

Projects should have a detailed implementation plan outlining how they will minimize negative impacts and maximize benefits, including strategies, milestones, timelines, and resources. Projects without strong implementation plans and resources to advance EEJ are unlikely to contribute to just processes and outcomes.

- How do specific strategies and milestones for EEJ align with project timelines?
- What staff (including staff expertise) and budgetary resources are needed to support EEJ implementation plans?

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[38] For more, see DOE's Justice40 website: https://www.energy.gov/diversity/justice40-initiative.

1.3 Labor and Work Implications

The deployment of energy technologies depends on the availability and engagement of a well-qualified workforce. Building public comfort with and expanding or adopting a new technology requires attention to health and safety issues, as incidents that damage life or property reduce public acceptance and can set promising new technologies back a generation. A skilled and trained workforce that can build and make high-quality, durable, and safe infrastructure and materials is therefore necessary to the successful deployment of new technologies.

Workforce availability is also an important consideration. When there is significant competition in the labor market – that is, when unemployment is low – employers must compete with higher wages and benefits to attract and retain skilled and qualified workers. The Bipartisan Infrastructure Law has brought unprecedented federal and private-sector investment in energy infrastructure, and employers and project developers are not only competing with other industries for workers, they are also competing amongst themselves. Because of this, project labor agreements (pre-hire collective bargaining agreements for construction projects) provide assurances of workforce availability and labor cost certainty that are beneficial to project developers (see more on PLAs in section 2.1.1 below). Building workforce education and training into project management through PLAs and other mechanisms can help expand the pool of qualified workers required on other projects, thus maintaining workforce stability even under volatile market conditions. A stable skilled workforce supports growth and scalability.

1.3.1 Good Jobs for Attracting and Retaining Workers

The energy sector needs a stable, skilled workforce to maintain, repair, expand, and operate a reliable and resilient energy system. The transition to clean energy provides new challenges and opportunities for workers; however workers have reported uncertainty about staying in the field. The pandemic reduced labor participation of women and other populations already underrepresented in the energy workforce. And generally clean energy provides mostly temporary construction jobs. To maintain a skilled workforce, efforts to ensure workforce stability and continuity, i.e. improving retention, are critical.

Good jobs attract—and retain—talent. In 2022, the U.S. Departments of Labor and Commerce published Good Jobs Principles to offer concrete and descriptive measures of job quality. DOE has built on and refined these principles for the energy sector (See What is A "Good Job"? in Community Benefits Plan Frequently Asked Questions (FAQs) | Department of Energy). The principles describe the features of jobs that attract workers: positions with family-sustaining pay; benefits such as healthcare, retirement contributions, and childcare; transparent and nondiscriminatory hiring and promotion structures; and practices that value workers and their input, including ensuring their ability to form or join a union without fear of retaliation. These principles provide a blueprint for attracting workers and keeping them in the energy sector, thus reducing the inefficiencies and productivity losses associated with high turnover.

Due to the need for a highly skilled and trained workforce, the energy sector reports the highest rates of private sector unionization. Unions improve worker retention and demonstrate higher productivity. Collective bargaining agreements (CBAs) ensure accountability to workers on company commitments to scheduling, wages, training and advancement opportunities, diversity and equity, and workplace health and safety. Project labor agreements reduce the risk of work slow-downs and stoppages due to labor disputes, skilled workforce availability, and workplace accidents. In addition, PLAs often support workforce education and training and DEI efforts through the use of registered apprentices and local or targeted hire commitments. As project risk reduction measures, PLAs and other CBAs help ensure the efficient and effective use of public and private sector investments.

1.3.2 Workplace Health and Safety

The energy transition must assure workplaces are healthy and safe for workers. Accidents and safety incidents will slow acceptance and adoption of new technology and increase the cost of deployment, so it is essential to build and support employees' health and safety as a core value, as both are key elements in achieving an organization's desired productivity and efficiency[39].

Prioritizing a culture of health and safety in the workplace allows workers to focus on their quality of work rather than potential hazards and safety risks. Implementing safety and health programs prevents workplace injuries, illnesses, and deaths, as well as the suffering and financial hardship these events can cause for workers, their families, and employers.

To ensure a healthy and safe work environment, workers are encouraged to help design, implement, and participate in health and safety programs by providing input and reporting safety or health concerns. Workers need access to information and freedom from retaliation when they raise safety and health concerns; report injuries, illnesses, and hazards; or exercise safety and health rights.

1.3.3 Collective Bargaining and Worker Organizing

The energy transition has the potential to reinvigorate the economy by supporting labor peace, union organizing, and collective bargaining. The middle class was built by unions, which have played an important role in ensuring that workers have a seat at the table: when workers have a voice, companies are more productive. Unions have helped drive higher wages, greater job security, new safety and health laws, family sustaining benefits, more workforce diversity, and protections from discrimination and sexual harassment. Worksites utilizing union labor experience lower rates of labor standards violations like employer wage theft or workplace safety and health hazards[40].

The energy sector should support and respect workers' free and fair choice to organize and collectively bargain. Energy employers should seek to establish collaborative relationships with their workers' unions and should consider staying neutral during union organizing, recognizing a union when supported by a majority of workers and negotiating collective bargaining agreements in good faith. For construction work, project labor agreements and community workforce agreements are good tools for managing complex projects and ensuring timely completion of construction work. Community benefits agreements are also a good tool to work with the broader community and build mutual trust among various stakeholders.

1.3.4 Investments in training and worker advancement

Employers will need to invest in equitable workforce development strategies to equip workers with the skills they will require to work safely and efficiently with cutting-edge technologies. This need for workforce development occurs as the United States is experiencing historically low unemployment rates, prompting American employers to increase spending on upskilling incumbent workers and training applicants.[41]

Specifically, registered apprenticeship programs can be valuable for developing a skilled workforce. Under the Inflation Reduction Act, using apprentices to build infrastructure projects can allow companies to earn tax credits that are five times larger than the base value. Other labor-management training programs can train the production and manufacturing workers.

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39   https://link.springer.com/article/10.1007/s41542-021-00080-x#Abs1
40   https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/26/fact-sheet-executive-order-establishing-the-white-house-task-force-on-worker-organizing-and-empowerment/
41   https://trainingmag.com/2022-training-industry-report/

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To begin, employers should engage with state and local [Workforce Development Boards](#), [American Job Centers](#), [State Apprenticeship Agencies](#) (where applicable), and [Apprenticeship](#) and [Pre-Apprenticeship](#) programs. To assess the efficacy and equity of their workforce development initiatives, employers should also collect and analyze data about training participants, such as their demographic characteristics, the number of participants that engage with and graduate from training and subsequently obtain aligned employment, and their wages and access to benefits.

1.3.5 Essential elements of labor and workforce

Below are some of the essential elements of labor and workforce support, followed by a few examples of guiding questions and actions for project developers to consider for new projects.

Projects should focus on workforce training, education, and development to build a well-educated, trained, and appropriately credentialed workforce in line with project needs, and to support workers' skill acquisition opportunities for advancement.

- How does the local labor force match up with project needs?
- How do training and education opportunities align with project needs?
- How should recruitment strategies fit the local community?
- What opportunities exist for initiatives including labor-management training partnerships, including registered apprenticeships and pre-apprenticeships; employer contributions to training programs and paid time for employees to participate in skills training; partnerships with community colleges; continuing education programs for employees to earn relevant credentials and degrees; and tuition
or flexible scheduling for education and training?
- Collaborating with worker representatives can help build the understanding needed to answer the questions above and ensure development initiatives are as effective as possible.

Projects should offer continuing advancement and skill acquisition, including continuing workforce education, professional development, and career advancement pathways with increased experience.

- What skills do workers need to advance in their careers? What are the continuing education goals of workers?
- What barriers exist to worker skill acquisition and advancement? What opportunities exist to support workers in overcoming these barriers? (E.g., employee-led tuition reimbursement programs can help overcome financial barriers for employees)
- What opportunities exist locally to partner with universities and third-party trainers to meet continuing education goals?

Employers can consider offering in-house corporate university programs or joint labor management training programs that allow employees to gain new skills and move up the career ladder.

Projects should offer continuing advancement and skill acquisition, including continuing workforce education, professional development, and career advancement pathways with increased experience.

- What skills do workers need to advance in their careers? What are the continuing education goals of workers?
- What barriers exist to worker skill acquisition and advancement? What opportunities exist to support workers in overcoming these barriers? (E.g., employee-led tuition reimbursement programs can help overcome financial barriers for employees)
- What opportunities exist locally to partner with universities and third-party trainers to meet continuing education goals?

Employers can consider offering in-house corporate university programs or joint labor management training programs that allow employees to gain new skills and move up the career ladder.

Projects should support employees' ability to organize, bargain collectively, and participate through labor organizations/unions of their choosing in decisions that affect them.

- Supporting workers' rights to join and form unions can build meaningful economic power, safeguards the public interest, contributes to the effective conduct of business, and facilitates the amicable settlement of disputes between employees and their employers.
- Workforce agreements, such as project labor agreements, for construction activities and a commitment to collective bargaining for ongoing operations work can help protect worker rights and ensure the smooth operation of projects.

Projects should create a safe work environment and a culture of safety for workers.

- Involving workers in the development and execution of workplace safety (including operational safety and personal safety), health, and anti-discrimination and harassment standards can help create a safe and productive work environment that is free from harassment and discrimination and offers safeguards for worker health and well-being.

Projects should prioritize retention, which includes tracking retention rates to help minimize attrition costs, surface workplace concerns, and identify where improvements need to be made. This kind of tracking can also help identify employee satisfaction.

- How can the workplace be supportive of workers' needs and uphold a sense of safety, belonging, and inclusion?
- What do workers say they want or need to feel valued and safe in their workplace?
- Which groups of workers have the highest levels of retention, and which have the lowest?

1.4 Diversity, Equity, Inclusion and Accessibility

Just as investing in worker training and good jobs enables project success by fostering physically safe, productive, and skillful workplaces, prioritizing diversity, equity, inclusion, and accessibility (DEIA) supports the innovation and collaboration projects need to thrive. By breeding creativity, attracting and retaining talent, and enhancing employee engagement and belonging, DEIA improves business outcomes and success, driving revenue growth and improved profitability.[42]

Energy technology innovation in the U.S. has created millions of jobs, but the energy sector workforce—particularly in skilled trades, technology innovation and commercialization, clean energy development, and upper-level management of high-growth industries like renewables development—does not equitably represent the country's gender and racial diversity. Women and Black workers are significantly underrepresented in clean energy careers[43], though the percentage of non-white workers is higher than the national average[44]. Compared to Black or African American and Latinx workers, white energy workers are more likely to report working in leadership roles, having access to professional development opportunities, receiving employer-sponsored healthcare and retirement contributions, and earning higher starting wages and higher wages overall. In 2021, roughly 40% of white workers reported earning an annual salary of $100,000 or more, compared to only 19% of Asian, Black or African American, or Latinx workers. Compared to BIPOC workers, white energy workers were more likely to feel accepted at their workplace and more likely to feel career satisfaction, and men were more likely to feel accepted and experience career satisfaction than women.[45]

Without equitable workforce development plans, employers may perpetuate inequities and exclude underserved populations from the economic benefits of clean energy investments. Employers can create inclusive employment pathways for these underserved groups through industry-aligned education and training programs, such as registered apprenticeships and pre-apprenticeships. They can support existing employees through continuing education programs and personalized, modularized, and flexible skills development, and in turn improve equity in these development programs by providing tuition assistance, flexible scheduling, and supportive services such as childcare, training stipends, and transportation assistance.

By fostering an environment where workers feel accepted, included, and supported, workplaces that prioritize DEIA create a sense of psychological safety that can boost focus and idea sharing, making it one of the most important factors of a high-performing team. The sense of safety, respect, and connectedness fostered through DEIA initiatives can help employees feel a stronger sense of community, belonging, and commitment to the team and project, allowing greater buy-in and collaboration and boosting productivity.

Accessible workplaces and systems support workers to fully and safely perform their roles and navigate the workspace, allowing them to reach their full potential. DEIA also supports high retention rates, which translate to greater institutional knowledge, deeper experience and skill growth among workers, improved efficiency, and greater likelihood of meeting financial goals. Compared to companies that do not prioritize inclusivity, highly inclusive companies are 120% more likely to hit their financial target goals; this is because of the benefits of both retention and improved innovation. Organizations with diverse leadership and workforces are more likely to financially outperform less diverse companies in part because they can innovate at a faster rate. Teams that can draw from a variety of experiences, ideas, and perspectives—and collaborate in a safe, inclusive, and accessible environment—are able to respond to challenges with innovative solutions and generate opportunities[46]. This can create an important competitive advantage for project teams operating in the rapidly evolving clean energy sector

42. https://www.forbes.com/sites/forbeshumanresourcescouncil/2021/05/19/15-key-benefits-of-dei-to-communicate-with-team-members/?
43. https://e2.org/wp-content/uploads/2021/09/E2-ASE-AABE-EEFA-BOSS-Diversity-Report-2021.pdf
44. USEER 2022 National Report (energy.gov)
45. Microsoft Word - Workforce Diversity Data Findings MASTER Final.docx (naseo.org)
46. https://www.forbes.com/sites/forbeshumanresourcescouncil/2021/05/19/15-key-benefits-of-dei-to-communicate-with-team-members/?sh=3bd3f3cb195c

1.4.1 Essential elements of DEIA

Below are some of the essential elements of DEIA, followed by a few examples of best practices for project developers to consider for new projects.

Projects should create new, or contribute to existing, internal diversity, equity, inclusion, and accessibility programs.[47]

- Employers can support DEIA by offering evidence-based, diversity-focused education programs (such as implicit bias training for staff).
- Employers can dedicate time and resources for team members to engage in DEIA training, networking, and learning opportunities externally.
- Employers can establish or improve reporting process for tracking DEIA milestones and metrics.
- Employers can improve worksite accessibility, including by collaborating and contracting with persons from underrepresented groups.
- Employers can hire minority business enterprises, minority-owned businesses, woman-owned businesses, and veteran-owned businesses to solicit as vendors and sub-contractors for bids on supplies, services, and equipment.
- Initiatives should respond to current state of DEIA in the organization and the economic opportunities (e.g., job opportunities, contracting opportunities, opportunities for suppliers) created from the project, and build toward clear goals.

Projects should improve access to jobs for members of the community, including individuals underrepresented in relevant industries and those facing barriers to employment.

- Employers can offer workforce training programs and pre-apprenticeship programs, and through participation in High Road Workforce Partnerships that include community-based organizations, community and technical colleges, local government, and union programs that serve populations with barriers to employment such as women, residents of disadvantaged communities, returning citizens.

Projects should consider DEIA when sharing knowledge or results to ensure information is accessible to everyone.

- Employers can disseminate results of research and development in MSIs or other appropriate institutions serving underserved communities, then a) work to make data available and accessible to communities that may be interested, b) collaborate with community groups to figure out how results or insights from the work could be useful for community priorities, and c) create educational opportunities for schools or other educational institutions in underserved communities where the project team could share their expertise on topics that the communities are interested in.
- **Projects should ensure the sustainability of DEIA efforts by focusing on DEIA leadership engagement, DEIA organizational structure and resources, and DEIA integration**.
- Employers can integrate DEIA into strategic planning, mission, and communications and advancing accountability through DEIA performance goals.

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[47] Well-intentioned but under-resourced DEIA work may perversely create additional harms or burdens for underrepresented groups, who are often asked to support DEIA initiatives. It is critical to analyze who is being asked to carry the load, how other work responsibilities are shifted to accommodate this, and how compensation for this work is provided. It is also critical to avoid tokenization – the practice of making only a perfunctory or symbolic effort to be inclusive to members of minority groups, especially by recruiting people from underrepresented groups to give the appearance of racial or gender equality. The de-facto expectation that individuals speak for or represent views from an entire group should also be avoided. Recognition for DEIA work should not just be financial; it comes at the expense of other activities and should be considered in review and promotion. Potential methods to avoid overburdening members of underrepresented groups include hiring external consultants or experts to support DEIA work; paying and otherwise valuing individuals who do DEIA work; creating "opt-in" mechanisms for participation; providing DEIA and/or implicit bias training to staff; creating safe and responsive channels for individuals to provide feedback about DEIA efforts; and offering support services

APPENDIX A

Some common steps to engage with relevant communities and other groups include:

- **Perform a social characterization analysis** that describes community dynamics, decision-making processes, and more, as outlined below.
- **Identify stakeholders, especially those that are most impacted by project development,** including labor unions and organizations representing underrepresented or disadvantaged communities and members of those communities.
- **Identify goals** for stakeholder engagement. This is informed by the social characterization analysis and is the first step in creating the Engagement Methods and Timeline subsection.
- **Choose methods** of stakeholder engagement suited for those goals and **prepare a timeline** for implementing the methods that tracks with project activities. This activity should include an analysis of opportunities for two-way engagement and Workforce and Community Agreements, which will be described in the relevant element of the Engagement section.
- **Specify roles** for who will be responsible for conducting engagement activities and continuing relationship-building with community organizations.
- **Identify feedback and evaluation strategies** that will measure whether engagements are successful, in the eyes of the LDES Demonstration team as well as the community members and stakeholders the team is working with.
- **Specify the resources needed** to carry out the engagement plans.

Publicly available resources offer guidance on community and labor engagement:

- Best Practices: Public Outreach and Education for Geologic Storage Projects: https://netl.doe.gov/node/5828
- Promising Practices for Meaningful Public Involvement in Transportation Decision-Making: https://www.transportation.gov/sites/dot.gov/files/2022-10/Promising_Practices_for_Meaningful_Public_Involvement-in-Transportation_Decision-making.pdf
- Solar Power in Your Community: https://www.energy.gov/sites/default/files/2022-06/Solar%20Power%20in%20Your%20Community%20Guidebook.pdf
- High-Road Workforce Guide for City Climate Action: https://www.usdn.org/uploads/cms/documents/workforce-guide_4.12.21_form.pdf
- Energy Justice Workbook: https://iejusa.org/workbook/.

APPENDIX B

Publicly available tools can help assess the characteristics of areas and groups impacted by a project, providing information on who is impacted and the burdens they face. These include:

- DOE's Disadvantaged Communities Reporter: https://energyjustice.egs.anl.gov/
- CDC's EJI Explorer: https://onemap.cdc.gov/portal/apps/sites/#/eji-explorer
- CEQ's Screening Tool: https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5
- EPA's EJScreen: https://ejscreen.epa.gov/mapper/
- State-level tools, including: https://climate.ny.gov/DAC-Criteria