



NARUC

National Association of Regulatory Utility Commissioners

Regulators' Energy Transition Primer

Economic Impacts of the Energy Transition on Energy Communities, Environmental Justice Considerations, and Implications on Clean Energy Jobs



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Acronyms

ACC	Assistance to Coal Communities
ACEEE	American Council for an Energy Efficient Economy
AEP	American Electric Power
AML	Abandoned Mine Land
CCUS	Carbon Capture, Utilization and Storage
CM	Critical Minerals
DOE	U.S. Department of Energy
EDA	U.S. Economic Development Administration
EIA	U.S. Energy Information Administration
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ETA	Employment Training Administration
FEJA	Future Energy Jobs Act
GW	Gigawatts
IEEE	Institute of Electrical and Electronic Engineers
IGCC	Integrated Gasification Combined Cycle
IOGCC	Interstate Oil and Gas Compact Commission
IWG	Interagency Working Group
LEAP	Local Energy Action Program
MACED	Mountain Association for Community Economic Development
MGA	Midwest Governors Association
MMT	Million Metric Tons
MW	Megawatts
MWDVBE	Minority, Women and Disabled Veteran Owned Business Enterprises
NAACP	National Association for the Advancement of Colored People
NARUC	National Association of Regulatory Utility Commissioners
NETL	National Energy Technology Laboratory
NREL	National Renewable Energy Laboratory
OMB	Office of Management and Budget
OJT	Office of Just Transition
PERI	Political Economy Research Institute
POWER	Partnerships for Opportunity and Workforce Revitalization
R&D	Research and Development
RECLAIM	Revitalizing the Economy of Coal Communities by Leveraging Local Activities and Investing More
REE	Rare Earth Elements
TAA	Trade Adjustment Assistance
UMWA	United Mine Workers of America
UNFCCC	United Nations Framework on Climate Change
USDA	U.S. Department of Agriculture
WHEJAC	White House Environmental Justice Advisory Council

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1. Introduction

From the mid-1980s through 2010, coal was a leading source of U.S. energy, providing up to half of the country's annual electricity.¹ Coal-fired electric power production peaked around 2007, when coal-fired electricity generating capacity in the U.S. totaled 313 gigawatts (GW) across 1,470 generators.² A decade later, about 70 GW of this capacity was retired. Many of these retirements were concentrated in Appalachia, the Southeast, the Illinois Basin, and a few in the Midwest and the Four Corners region (northeast Arizona, northwest New Mexico, eastern Utah, and western Colorado).³ Of the 237 U.S. coal-fired power plants that are still operational, 69 have announced retirement dates near or by 2025.⁴

Applications of new technology, such as horizontal drilling and hydraulic fracturing, enabled the United States to significantly increase its production of oil and natural gas during the last decade—the “Shale Gas Revolution.” As natural gas began to dominate the market with abundant supply and low prices, coal production and consumption have declined. Concurrently, the competitiveness of renewable energy and energy storage has climbed sharply, and analysts expect to see continued reductions in fossil fuel use in the coming decades. Many of these changes have been driven by market forces (i.e., low-cost natural gas and renewables), but current and future policy decisions aimed at tackling climate change concerns and reducing greenhouse gas emissions will also shape the future of the energy sector.

This transition to low-carbon fuels has created both opportunities for clean energy technologies and challenges for communities traditionally dependent on fossil fuel-related industries. The power sector's ongoing shift away from coal has left many coal miners and coal-fired power plant employees unemployed and often unprepared for jobs in other industries, including growing clean energy fields. This primer focuses on the declining coal industry, impacts on communities and workers, opportunities to transition workers who have lost their jobs to clean energy and other related sectors (including hydrogen-oriented jobs), recruitment and training strategies, and available programs and actions to make the shift to a low-carbon economy in a fair, just, and equitable manner by engaging the resources of federal and state governments, as well as the private sector.

1 U.S. Energy Information Administration, “Fossil Fuel Production Expected to Increase Through 2022 but Remain Below 2019,” Today in Energy, January 15, 2021, <https://www.eia.gov/todayinenergy/detail.php?id=46496>

2 Ibid.

3 “Initial Report to the President on Empowering Workers Through Revitalizing Energy Communities,” Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization, April 2021, https://netl.doe.gov/sites/default/files/2021-04/Initial%20Report%20on%20Energy%20Communities_Apr2021.pdf

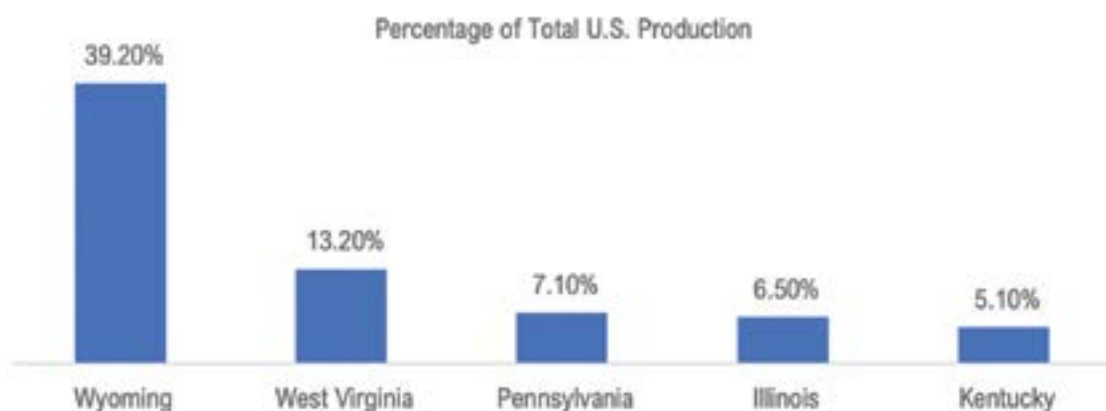
4 U.S. Energy Information Administration, “Nuclear and Coal Will Account for Majority of U.S. Generating Capacity Retirements In 2021,” Today in Energy, January 21, 2021, <https://www.eia.gov/todayinenergy/detail.php?id=46436>

2. Economic Impacts on Coal-Dependent Communities

The transition away from coal as a primary source of electricity generation has accelerated over the last decade and resulted in significant job losses and economic downturn in fossil-dependent communities. Without intervention, the social and economic effects of this transition can have severe and long-term consequences, both directly for workers and indirectly for the communities that depend on the fossil industry for tax revenues and local employment. Through several financial mechanisms, including but not limited to a variety of taxes, lease bonuses, royalties, and severances, many local governments have been able to finance a broad suite of public services and community investments with coal revenues, such as schools and other public infrastructure. Conversely, declines in the coal industry have resulted in sudden budget shortfalls, forcing local governments to cut public services and / or increase tax rates. The recent decline in coal production has left many regions struggling to generate new economic opportunities to replace the revenue and employment provided by the coal industry.

Currently, U.S. coal production is geographically concentrated in five states that account for more than 70 percent of the country's total production: Wyoming, West Virginia, Pennsylvania, Illinois, and Kentucky (*Figure 1*). The decline in coal production has had a pronounced social and economic impact on these states.

Figure 1: U.S. Coal Production by Top 5 States (2019)



According to the U.S. Energy Information Administration (EIA), U.S. coal production declined by 32 percent between 2007 – 2017 and, in terms of employment, coal jobs also have been rapidly decreasing. At its height in the 1920s, the coal industry employed 860,000 people.⁵ As shown in *Figure 2*, the coal industry employed 87,290 mining workers in 2011. Since then, employment has been cut roughly in half to approximately 40,000 workers as of 2021.⁶ A report from the Sustainable Development Solutions Network found that as many as 12,000 workers in the coal mining and related industries will lose their jobs each year from 2021 to 2030.⁷

As the U.S. takes steps to address climate change, coal-dependent communities will inevitably face dramatic losses in coal-related revenues. The economic impacts of this transition place many coal-dependent communities at more risk. In acknowledging the Biden Administration's energy agenda, the United Mine Workers of America (UMWA) indicated that it would support the transition from fossil fuels to renewable energy as long as coal workers have access to employment pathways in renewable energy and support for workers who lose their jobs. The UMWA's plan calls for the creation of new jobs through tax credits that would subsidize the manufacturing of solar panels and wind turbine components, and by funding the reclamation of

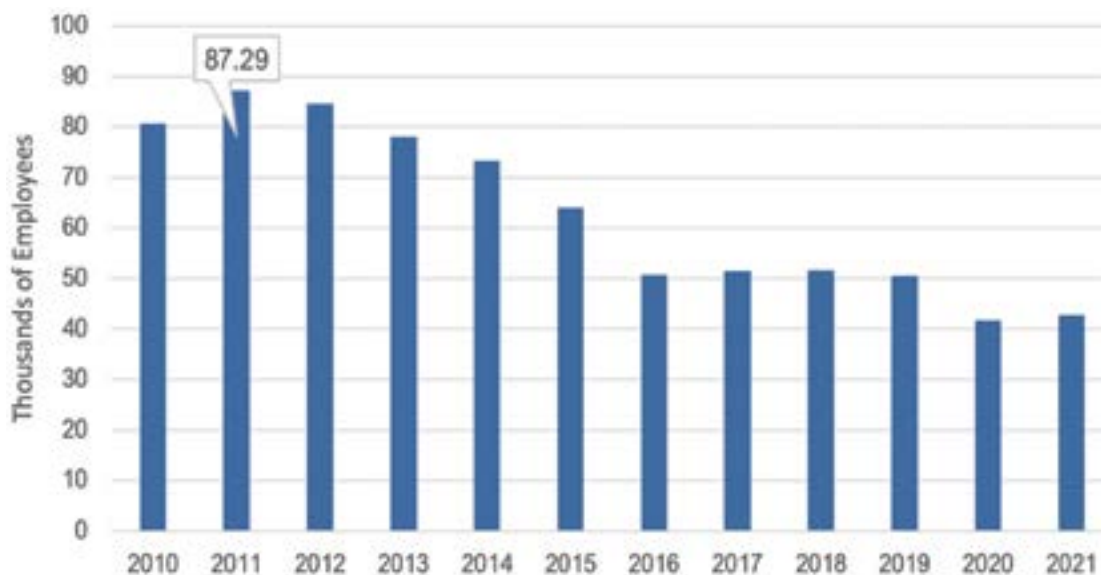
⁵ Ibid.

⁶ FRED Economic Data, "All Employees, Coal Mining, <https://fred.stlouisfed.org/series/CES1021210001>

⁷ Sustainable Development Solutions Network, "America's Zero Carbon Action Plan," 2020, <https://irp-cdn.multiscreensite.com/6f2c9f57/files/uploaded/zero-carbon-action-plan%20%281%29.pdf>

abandoned mines. In addition, the UMWA is supportive of research on carbon capture, utilization, and storage (CCUS) technologies that could keep some coal plants open.⁸

Figure 2: Coal Mining Industry Employment, 2010-2021



Data from U.S. Bureau of Labor Statistics

Past and current examples of the impacts of the declining coal industry are summarized for the top five coal-producing states.

Wyoming

- Employment in coal mining declined from about 7,000 in 2010 to 4,500 in 2021.
- Between 2008 and 2016, coal production fell by 50 percent. Moreover, the decline will continue to accelerate due to stricter restrictions on pollution, competition from low-cost natural gas, and the decreasing cost of wind and solar energy.
- Wyoming's coal mining industry lost 20 percent of its customer base in the past 10 years and will lose another 23 percent over the next 10 years as many of the nation's coal-fired power plants shut down, according to a report by the University of Wyoming and Montana-based Headwaters Economics.
- Severance taxes paid by coal companies fell by 26 percent from 2014 through 2018.
- A University of Wyoming energy economist described the coal industry in the state as: "It's like the elevator is not just plunging down the elevator shaft; the cable broke and we're just going straight down."⁹

West Virginia

- Coal mining and logging related employment in West Virginia was about 34,000 in 2011, falling to about 18,000 in 2021.
- Coal employment in West Virginia accounts for about \$1.1 billion in annual wages.
- In 2017, coal mines contributed about \$6.5 billion to the state's economy, not including indirect impacts, such as local supplies or upstream businesses, such as distribution networks and electric power generation.

⁸ Stancil, Kenny, "Coal Miners' Union Backs Clean Energy Transition, Green Energy Jobs to Replace Dirty Coal," *Red, Green and Blue*, April 20, 2021, <http://redgreenandblue.org/2021/04/20/coal-miners-union-backs-clean-energy-transition-green-energy-jobs-replace-dirty-coal/>

⁹ Dustin Bleizeffer and Mason Adams, "Transition in Coal Country: Rural Communities on the Brink," *WyoFile*, June 23, 2020, <https://wyofile.com/transition-in-coal-country-rural-communities-on-the-brink/>

- Coal overall generated a combined economic impact of nearly \$13 billion during 2017, a total employment impact of 16,000 direct and 23,000 indirect jobs, and a total employee compensation impact of \$2.5 billion.¹⁰
- The impact of declining employment is even more pronounced in West Virginia because average wages for coal miners are nearly double the average pay in other private sector industries in the state.¹¹
- West Virginia's coal industry relies more on exports than domestic consumption, which leaves it much more vulnerable to market fluctuations.¹²
- Tax revenues generated from the coal industry have declined by nearly 50 percent, from \$483 million in 2011 (12 percent of total state revenue) to \$262 million in 2016 (6 percent of revenues).¹³
- The industry's decline has hit some communities much harder. For example, in Mingo County, coal mining employed 1,400 people (8 percent of the county population) at the end of 2011 and that number had fallen to fewer than 500 by end of 2016.¹⁴
- The president of the West Virginia Coal Association is quoted as saying: "Job losses and poverty are the fertile ground in which drug abuse grows. Many of our people have simply given up looking for jobs. They have lost their homes, their cars, their dreams, and their hope."¹⁵

Pennsylvania

- Coal mining employment declined from about 8,600 jobs in 2012 to under 4,000 jobs in 2021.
- According to the Institute for Public Policy and Economic Development at Wilkes University, Bradford and Luzerne counties have lost \$700 million combined in economic output due to coal mining closures and production declines.¹⁶

Illinois

- Despite a modest uptick in coal production in the last 10 years, Illinois is projected to produce significantly less coal in the future.
- Employment in coal mining declined from 4,500 in 2012 to 3,100 in 2019.
- Many communities rely on the coal industry as a primary source of employment and income. In addition to jobs that are directly created at coal mines, it is estimated that about five additional non-mine jobs are created for each miner employed in Illinois. That is because many other commodities and services are needed to support the mining operation and the miners' families. In a few areas in Illinois, direct mining jobs and their spin-off jobs can account for as much as 50 percent of the total county employment.¹⁷

10 West Virginia University, "The Economic Impact of Coal in West Virginia," Summer 2018, <http://busecon.wvu.edu/bber/pdfs/Econ-Impact-Coal-2018.pdf>

11 Christiadi and John Deskins, "The Economic Impact of Coal in West Virginia," Bureau of Business & Economic Research West Virginia University College of Business and Economics, 2018, <http://busecon.wvu.edu/bber/pdfs/Econ-Impact-Coal-2018.pdf>

12 Charles Young, "Old King Coal: WV's Coal Industry Struggles for Stability During Continued Decline," WV News, Dec. 1, 2019, https://www.wvnews.com/news/wvnews/old-king-coal-wvs-coal-industry-struggles-for-stability-during-continued-decline/article_9d349047-da1a-5219-9684-88c9037d691b.html

13 Adele C. Morris, Noah Kaufman, Siddhi Doshi, "The Risk of Fiscal Collapse in Coal-Reliant Communities," The Brookings Institute, July 2019, https://www.brookings.edu/wp-content/uploads/2019/05/Morris_Kaufman_Doshi_RiskoffiscalCollapseinCoalReliantCommunities-CGEP_Report_FINAL.pdf

14 Ibid.

15 Eric Scheuch, "Life After Coal: The Decline and Rise of West Virginia Coal Country," Columbia Climate School Blog, August 7, 2020, <https://blogs.ei.columbia.edu/2020/08/07/coal-rise-decline-west-virginia/>

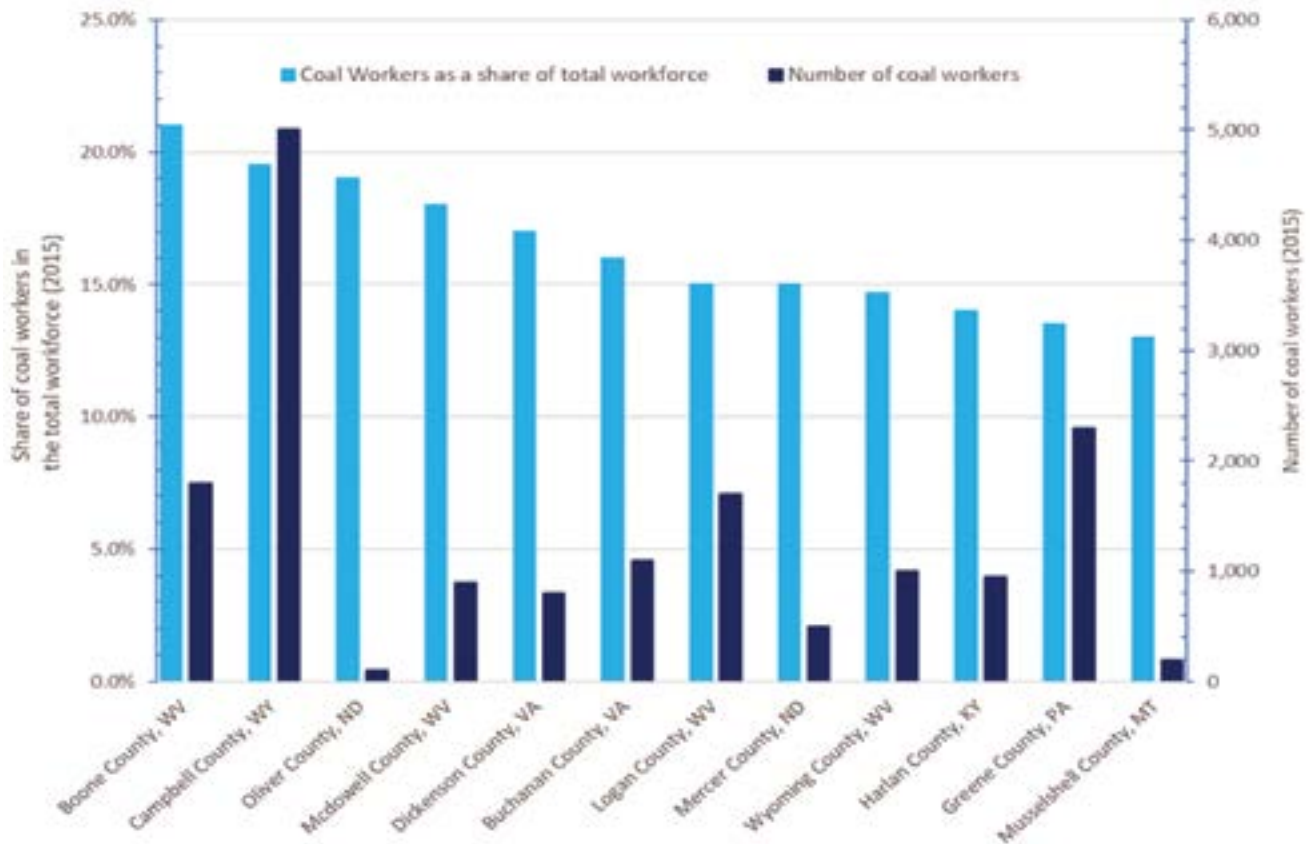
16 "Appalachian Regional Commission Study: Economic Impacts and Effects of Coal Mining in Northeastern Pennsylvania," The Institute for Public Policy and Economic Development at Wilkes University, <https://instituteipa.org/perch/resources/economic-impact-of-coal-production-decline-in-nepathe-institute.pdf>

17 Krizka Del Rosario and Taylor Kuykendall, "Top Coal Mines in Illinois Basin Decreased Production 2% in 2019," S&P Global, February 12, 2020, <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/top-coal-mines-in-illinois-basin-decreased-production-2-in-2019-57056452>

Kentucky

- Employment in the coal mining sector declined from 16,600 in 2011 to 3,500 in 2020.¹⁸
- In Eastern Kentucky, the decline in coal production and coal mine closures has forced people to move from their homes to find new jobs across the state and region.¹⁹
- Muhlenberg County, once one of the nation's largest coal-producing counties, has lost more than 90 percent of its coal mining jobs in the last few decades.²⁰

Figure 3: Top Twelve U.S. Counties by Coal Employment Share²¹



Source: U.S. Bureau of Labor Statistics

The U.S. Department of Agriculture's (USDA's) Economic Research Services defines a county as "mining dependent" if 8 percent or more of its employment is engaged in the mining industry.²² Applying this standard to the most recent employment data (2015), 26 U.S. counties are considered to be coal mining dependent. These counties will not only continue to experience a reduced workforce as a result of coal's decline as a source of electricity, but will also be affected by shrinking revenue, property values, and a reduction in local economic activity. **Figure 3** shows the top 12 counties with dependence on the coal mining industry and the share of coal

18 FRED Economic Data, "All Employees: Mining: Coal Mining in Kentucky," <https://fred.stlouisfed.org/series/SMU21000001021210001A>

19 Lexington Herald Leader, <https://www.kentucky.com/news/state/kentucky/article234186027.html>

20 "Iconic Plant's End Spells Doom for Struggling Coal Industry," Associated Press, March 24, 2020, <https://www.usnews.com/news/business/articles/2020-03-24/iconic-plants-end-spells-doom-for-struggling-coal-industry>

21 Adele C. Morris, Noah Kaufman, Siddhi Doshi, "The Risk of Fiscal Collapse in Coal-Reliant Communities," The Brookings Institute, July 2019, https://www.brookings.edu/wp-content/uploads/2019/05/Morris_Kaufman_Doshi_RiskoffiscalCollapseinCoalReliantCommunities-CGEP_Report_FINAL.pdf

22 U.S. Department of Agriculture. 2019. "Descriptions and Maps: County Economic Types, 2015 Edition," Economic Research Service, 2019, <https://www.ers.usda.gov/data-products/county-typology-codes/descriptions-and-maps.aspx#mining>

workers in each county's total workforce, as of 2015. Although the revenue streams of these counties differ in composition, each county's budget and ability to provide public services are heavily dependent on the coal industry and, by having relied on coal as an economic driver, each is significantly affected by the rapid changes of the coal industry.^{23 24}

23 Siddhi Doshi, Noah Kaufman and Adele Morris, "Why Local Governments Should Prepare for the Fiscal Effects of a Dwindling Coal Industry," Tax Policy Center, The Urban Institute and Brookings Institution, August 20, 2019, https://www.taxpolicycenter.org/sites/default/files/publication/157615/why_local_governments_should_prepare_for_the_fiscal_effects_of_a_coal_industry.pdf

24 Ibid.

3. Environmental, Climate, and Energy Justice Considerations

As the U.S. continues to transition away from its dependence on fossil fuels, policymakers are continuing to address health, social, and economic burdens generated by the current energy system. Negative externalities on communities that host fossil infrastructure include health disparities, loss of lands, sustained financial dependence on the fossil fuel industry, environmental hazards in certain areas of the community, and inconsistent enforcement of environmental laws. As clean energy continues to grow, there is an urgent opportunity to address these challenges and shape policies and projects to assist these communities.

In the case of environmental justice, key principles of this concept include fair distribution related to the burdens of energy and industrial project development, and aspects and application of the development, implementation and enforcement of environmental laws, regulations, and policies. In 1994, Executive Order (EO) 12898 required that achieving environmental justice must be a part of each federal agency's mission.²⁵ Under the EO, federal agencies must develop strategies that identify and address health and environmental effects that disproportionately impact minority and low-income populations. It also emphasized the importance of using the National Environmental Policy Act (NEPA) review processes to promote environmental justice, directing federal agencies to analyze the environmental effects, including human health, economic, and social effects of their proposed actions on minority and low-income communities.²⁶

Climate justice, a term used to frame climate change as an ethical and political issue, emerged in the late 1990s and early 2000s at COP 6, the sixth session of the United Nations Framework Convention on Climate Change (UNFCCC), where the first Climate Justice Summit took place.²⁷ One of the key principles of the climate justice field is to identify and advocate for "frontline communities" that are disproportionately affected by climate change impacts and have the least ability to respond or "bounce back" from the impacts of climate change.

Building on the influences of environmental justice and the climate change movement, energy justice refers to the goal of achieving equity in both social and economic participation in the energy system, while also remediating social, economic, and health burdens on those historically harmed by the energy system.²⁸ With an explicit focus on disadvantaged communities, energy justice aims to make energy more accessible, affordable, clean, and democratically managed for all communities. Other key concerns of the energy justice movement include issues of access, fairness, and informed participation in energy decision-making.²⁹

In 2011, the National Association for the Advancement of Colored People (NAACP) studied the distribution of U.S. coal-fired power plants and evaluated their distribution against population demographics.³⁰ Specifically, the report ranked all 378 U.S. coal fired power plants according to the plant's impact on health, economics, and environment of nearby communities. Overall, the report revealed that people living near coal plants were disproportionately poor and minorities. Among the six million people who lived within three miles of the 378 plants, the average per capita income was \$18,400 per year, with 39 percent of them being people of color.³¹

25 "Summary of Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations", EPA Website, <https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice>

26 U.S. Environmental Protection Agency, "Environmental Justice and National Environmental Policy Act," April 2021, <https://www.epa.gov/environmentaljustice/environmental-justice-and-national-environmental-policy-act>

27 Fact Sheets from the Sixth Session of the Conference of the Parties to the UN Framework Convention on Climate Change (COP-6), U.S. Department of State Bureau of Oceans and International Environmental and Scientific Affairs, November 13-24, 2000, https://1997-2001.state.gov/global/global_issues/climate/cop6/index.html

28 "Defining Energy Justice: Connections to Environmental Justice, Climate Justice, and the Just Transition," *The Energy Justice Workbook*, Sec. 1, Initiative for Energy Justice, https://iejusa.org/section-1-defining-energy-justice/#_edn13

29 Ibid.

30 "Coal Blooded: Putting Profits Before People," National Association for the Advancement for Colored People, 2011, <https://naacp.org/resources/coal-blooded-putting-profits-people>

31 Ibid.

Energy Justice

Energy justice is defined as “achieving equity in both the social and economic participation in the energy system, while also remediating social, economic, and health burdens on those historically harmed by the energy system (frontline communities).” [Initiative for Energy Justice, Defining Energy Justice](#)

DOE defines environmental justice 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.”

As the Biden Administration has made environmental justice and assistance to distressed communities a major area of focus, environmental justice groups have sought to link communities of color focused on addressing industrial pollution in Appalachia.³² One group that has successfully supported these communities is the Alliance for Appalachia. The group looks to promote a healthy and just Appalachia by supporting communities impacted by resource extraction. The group works with its partners on federal and regional campaigns with organizations such as Earthjustice, Climate Justice Alliance, the Extreme Energy Extraction Collaborative, Catalyst Project, and the Appalachian Citizen’s Law Center. The group has focused on issues such as water monitoring and enforcement, land ownership reform and remediation of abandoned coal mines and support for the Revitalizing the Economy of Coal Communities by Leveraging Local Activities and Investing More (RECLAIM) Act, which, if reauthorized, would use fees from coal companies for environmental remediation projects in coal communities.³³

In September 2021, DOE launched the Local Energy Action Program (Communities LEAP)—an initiative designed to help communities with historical ties to fossil fuel industries take direct control of their clean energy future. The Communities LEAP pilot program provides supportive services valued at up to \$16 million to help communities develop locally driven energy plans to more effectively leverage public and private sector resources to reduce local air pollution, increase energy resilience, lower utility costs and energy burdens, and create good-paying jobs. Communities LEAP is available to assist to up to 36 low-income and energy-burdened communities that are either experiencing environmental justice concerns or direct economic impacts from the shift away from historical reliance on fossil fuels. Communities participating in Communities LEAP will develop an initial roadmap for identifying clean energy economic development pathways or accelerate progress toward existing plans for clean energy development projects.³⁴

32 Stephen Lee and Dean Scott, “Big Tent Environmental Justice Plan Looks Past Racial Divides”, *Bloomberg Law*, February 5, 2021, <https://news.bloomberglaw.com/environment-and-energy/big-tent-environmental-justice-plan-looks-past-racial-divides>

33 The Alliance for Appalachia Website. <https://theallianceforappalachia.org/>

34 U.S. Department of Energy, “DOE Announces \$16 Million to Support Community-Driven Pathways to Clean Energy,” September 15, 2021, <https://www.energy.gov/articles/doe-announces-16-million-support-community-driven-pathways-clean-energy>

4. Potential Opportunities for the Fossil Fuel Workforce to Enable the Clean Energy Economy

The transition to clean energy presents an opportunity to retrain workers and repurpose fossil infrastructure. When large investments in renewable energy are made in communities impacted by the decline of the coal industry, workers with complementary skills and experience in conventional energy sectors could have the opportunity to make an easier transition to clean energy jobs.³⁵ This is particularly relevant for communities that have a great potential for development of wind generation, such as in the Great Plains states and the Intermountain West, and the development of solar generation in regions such as the Southeast, Southwest and Mountain West.³⁶

The hydrogen industry is poised to expand, especially in areas such as meeting demand for desulfurized petroleum products and as a clean transportation fuel. As the industry grows, there are likely to be a variety of jobs in the hydrogen and fuel cell industries across the value chain, which can be created in several states and regions. The emerging industry can also create industry clusters that support communities that have traditionally relied on coal.³⁷ As discussed in NARUC's 2021 publication, *Coal and Carbon Management Guidebook: Coal-to-Hydrogen Opportunities and Challenges*, fossil fuels, including natural gas and coal, account for nearly all global hydrogen production currently. With continued advances in carbon capture and hydrogen production technologies, fossil resources can play a major role in growing the low-carbon hydrogen market, delivering benefits to fossil workers and communities.

In order to meet U.S. hydrogen demand projections, significant infrastructure will need to be built and operated, along with the attendant jobs. Current U.S. hydrogen demand is 10 million metric tons (MMT)/year and domestic energy resources available today are sufficient to meet an additional 10 MMT of hydrogen demand in 2040.³⁸ Recent modeling and analysis efforts conducted by DOE's national laboratories estimated the U.S. hydrogen production and demand potential over the next 30 years to reach 41 MMT/year, assuming successful outcomes of research and development (R&D) efforts in key areas. Based on the assessment, the U.S. could see a two- to four-fold increase in hydrogen demand by 2050.³⁹

To keep the production cost of coal-based hydrogen competitive with alternatives such as natural gas, power plants will either need to be converted/retrofit or built with CCUS technologies. These projects, alongside other modifications to existing power plants, will require engineers, construction workers, pipefitters, and other specialized labor. They will also require additional employees to operate the machinery and manufacture new parts for the facilities. Estimates provided by The Rhodium Group show that retrofitting a typical coal plant with CCUS technology would likely yield 3,600 to 5,400 project jobs annually, as shown in **Figure 4**.⁴⁰ DOE estimates that if coal-to-hydrogen production and carbon products industries expand over the next 30 years, new coal production of 145–345 million tons would be needed and could result in 47,500 jobs. The

35 Caroline George, Joseph Kane, and Adie Tomer, "How Renewable Energy Jobs Can Uplift Fossil Fuels Communities and Remake Climate Politics," Brookings Institution, February 23, 2021, <https://www.brookings.edu/research/how-renewable-energy-jobs-can-uplift-fossil-fuel-communities-and-remake-climate-politics/>

36 Ibid.

37 Roger Bezdek, "The Hydrogen Economy and Jobs of the Future," Renewable Energy and Environmental Sustainability, 2019, https://www.rees-journal.org/articles/rees/full_html/2019/01/rees180005s/rees180005s.html

38 Connelly, Elizabeth, Michael Penev, Anelia Milbrandt, Billy Roberts, Nicholas Gilroy, and Marc Melaina. 2020. Resource Assessment for Hydrogen Production. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5400-77198. <https://www.nrel.gov/docs/fy20osti/77198.pdf>

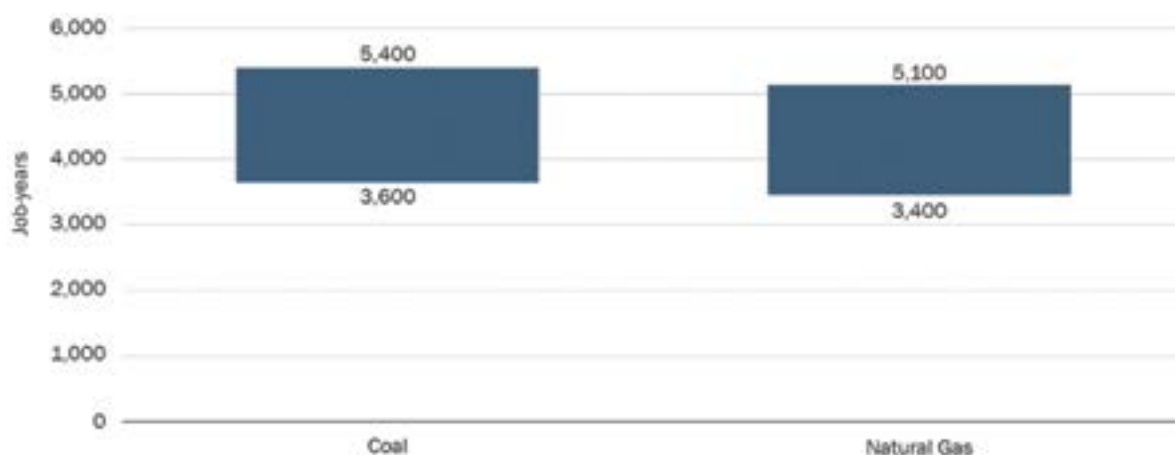
39 Ruth, Mark F., P. Jadun, N. Gilroy, E. Connelly, R. Boardman, A.J. Simon, A. Elgowainy, and J. Zuboy. 2020. "The Technical and Economic Potential of the H2@Scale Hydrogen Concept within the United States," National Renewable Energy Laboratory, NREL/TP-6A20-77610, <https://www.nrel.gov/docs/fy21osti/77610.pdf>

40 Whitney Herndon, Galen Hilbrand, Ben King and John Larsen, "Capturing the Moment: Carbon Capture in the American Jobs Plan," Rhodium Group, April 21, 2021, <https://rhg.com/research/carbon-capture-american-jobs-plan/>

carbon products could also result in product value of approximately \$139 billion and 480,000 manufacturing jobs tied directly to carbon products.⁴¹

In an effort to stimulate this technology, in March 2021, DOE awarded \$2 million to four R&D projects advancing clean hydrogen technologies, including co-gasification. The American Jobs Plan expressed support for pairing investments in 15 decarbonized hydrogen demonstration projects in distressed communities with a new production tax credit to spur capital retrofits and installations that further decarbonize U.S. industry.⁴²

Figure 4: Total Project Job Years Associated with Carbon Capture Retrofits at Typical Fossil Power Plants



Source: Rhodium Group analysis

A 2020 report by Frost and Sullivan identified energy transformation as one the top five growth opportunities in the energy and environment industry for 2021. The study assessed that as decarbonization of the electric system continues, coal plants will continue to decline, but investments in renewable energy will accelerate and are expected to reach up to \$340 billion on an annual basis over the next decade.⁴³ Key sectors that are likely to create energy and environmental industry jobs include: residential and commercial solar photovoltaics, battery energy storage, the development of more sustainable industries and supply chains focused on net-zero carbon policies and water scarcity, smart buildings, electrification of transportation, heating and industrial processes, and new service-based models for energy.⁴⁴

A key challenge of switching from fossil to clean energy jobs is the fact that clean energy jobs generally pay less than fossil jobs. According to recent data from the Energy Futures Initiative, workers in the wind and solar industries make an average of \$5 less per hour than those that work in the natural gas sector. Unionization in the wind and solar sectors has been slow to develop, which has contributed to lower wages.⁴⁵ However, according to the U.S. Energy and Employment Report, employees in the energy sector, including both fossil and clean energy jobs, still earn higher wages than most other sectors of the economy. Some of the key factors

41 Steve Winberg, "Clean Coal Is Crucial for American Jobs, Energy Security, and National Supply Chains," DOE Press Release, June 26, 2020, <https://www.energy.gov/articles/clean-coal-crucial-american-jobs-energy-security-and-national-supply-chains>

42 "Fact Sheet: The American Jobs Plan," The White House, March 30, 2021, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/>

43 "Top 5 Growth Opportunities in the Energy and Environment Industry for 2021," Smart Energy International, December 1, 2020, <https://www.smart-energy.com/industry-sectors/business/top-5-growth-opportunities-in-the-energy-environment-industry-for-2021/>

44 Ibid.

45 Sarah Golden, "How Clean Energy and Fossil Fuel Interests Fight to Own the Jobs Narrative," Greenbiz, April 30, 2021, <https://www.greenbiz.com/article/how-clean-energy-and-fossil-fuels-interests-fight-own-jobs-narrative>

that determine energy wages are geography, education and training, and unionization.⁴⁶ In addition, energy-related jobs in the areas of construction and manufacturing generally pay less than those focused on utilities, mining and extraction, and professional services.⁴⁷ In some cases, coal workers could be going from an annual salary of \$75,000 to jobs that are paying in the \$12–\$15 an hour range.⁴⁸

In addition to clean energy development, other jobs that could be created for fossil energy workers include rehabilitating abandoned coal mines and plugging orphan oil and gas wells. The benefits of mine reclamation projects include improving air and water quality, preventing landslides, and minimizing wildlife and public health risks. These jobs could also increase economic development for communities by creating new recreation and tourism opportunities. With respect to abandoned oil and gas wells, the Interstate Oil and Gas Compact Commission (IOGCC) has identified more than 56,000 orphan wells in 30 states, which could create up to 13,500 potential jobs. The bulk of these wells are in Texas, Oklahoma, and Pennsylvania.⁴⁹

In the case of coal plant closures, because retirements are generally announced and implemented over a multi-year timeframe, in many cases, larger utilities are able to find different jobs for their employees within the company. This was the case when American Electric Power (AEP) looked to retire more than 6,000 megawatts (MW) of coal-fired generation at 11 power plants in seven states. AEP began the planning process in 2012, which allowed the company to shift displaced workers to internal jobs that became available due to attrition and retirements. Also, in some cases, employees decided to train for line mechanic jobs working on transmission and distribution, whereas others took jobs at AEP natural gas plants.⁵⁰

In regions such as Appalachia, the renewable energy sector has the potential to offer new employment opportunities for the coal workforce. However, many positions look for “middle job skills,” which require more than a high school diploma but less than a four-year degree. One successful program in aligning coal worker skills with renewable energy needs has been How\$martKY, a project sponsored by the Mountain Association for Community Economic Development (MACED). The project provides on-bill financing for energy efficiency retrofits to rural homes. MACED provides technical assistance and support to contractors to be retrained to do the retrofits. Contractors who have worked with the program have diversified their client base and created jobs.⁵¹

Another area of opportunity for workers affected by the clean energy transition is the energy efficiency industry. In 2019, the U.S. energy efficiency industry employed 2.38 million people across sectors such as HVAC and construction.⁵² The largest part of the energy efficiency sector is the construction industry. Currently, employers in this sector have indicated that it can be difficult to hire new employees due to lack of experience, training, and technical skills.⁵³ A report by the American Council for an Energy Efficient Economy (ACEEE) outlines strategies to create a more diverse and inclusive workforce.⁵⁴ Key recommendations include:

46 “Wages, Benefits, and Change: A Supplemental Report to the Annual U.S. Energy and Employment Report,” National Association of State Energy Officials, Energy Futures Initiative, and BW Research Partnership, 2020, <https://static1.squarespace.com/static/5a98cf80ec4eb7c5cd928c61/t/606d1178a0ee8f1a53e66206/1617760641036/Wage+Report.pdf>

47 Ibid.

48 Roy Gilbert, “Rethinking Retraining: Why Worker Training Programs Alone Won’t Save Coal Country,” October 7, 2019, <https://gilbert.terrywilson3.net/2019/10/07/rethinking-retraining-why-worker-training-programs-alone-wont-save-coal-country/>

49 Ibid.

50 Michele White, “Supporting Coal Power Plant Workers Through Plant Closures,” Power Magazine, June 1, 2016, <https://www.powermag.com/supporting-coal-power-plant-workers-plant-closures/>

51 “Entrepreneurial Appalachia: Case Studies in Evolving Economic Sectors,” Rural Support Partners on behalf of the Appalachian Regional Commission, November, 2013, <http://1n139ky44wl2212pm2tq3swx-wpengine.netdna-ssl.com/wp-content/uploads/2018/04/EntrepreneurialAppalachiaCaseStudiesinEvolvingEconomicSectors.pdf>

52 E2, “Clean Jobs America 2020,” <https://e2.org/wp-content/uploads/2020/04/E2-Clean-Jobs-America-2020.pdf>

53 Ibid.

54 Shoemaker, Mary, Ayala, Roxana and York, Dan, “Expanding Opportunity Through Energy Efficiency Jobs: Strategies to Ensure a More Resilient, Diverse Workforce,” American Council for an Energy Efficient Economy, October 2020, <https://www.aceee.org/research-report/u201>

- Initiating voluntary supply initiatives and providing training for companies that are minority-, women-, and disabled veteran-owned enterprises (MWDVBEs);
- Offering training for both contracting firms and students;
- Utilizing state policies to advance workforce development programs;
- Encouraging partnerships between state agencies and community-based organizations that offer job training;
- Working with community-based organizations to overcome employment barriers for underrepresented populations;
- Providing co-training for energy efficiency related jobs; and
- Collecting data and monitoring the performance of workforce training programs.

Additionally, the report recommends that these training programs should be smaller in nature to help students find jobs after training programs and that these programs should be paid.

Related Resource for Communities in Transition

The Interstate Renewable Energy Council (IREC) supports the transition to a clean energy future, including regulatory reform, workforce development, and local initiatives. In the area of workforce development, IREC developed a series of Clean Energy Career Maps, which are interactive tools that educators, career advisors, job seekers, employers, policymakers, and workforce professionals can use to explore the many diverse careers offered across the growing clean energy industry. These maps—including the Green Buildings Career Map, Solar Career Map, and Climate Control Technology Map—describe dozens of careers, as well as their various routes for advancement.

Interstate Renewable Energy Council (IREC), “Clean Energy Career Maps,” <https://irecusa.org/career-maps/>
IREC, “2020 Annual Report,” <https://irecusa.org/wp-content/uploads/2021/07/IREC-Annual-Report-2020-Final-Draft.pdf>

In the renewable energy area, DOE has mapped out more than 40 types of solar industry jobs. These include electricians and installers who work on the building of residential, commercial, and utility-scale solar projects, manufacturing of solar panels and other components, salesmen, and professional support for solar companies.⁵⁵ In 2017, DOE listed the top renewable energy jobs as wind turbine technician, solar installer, clean car engineer, sustainable builder, and sustainability professionals.⁵⁶ All of these jobs require different levels of education and training. As of 2018, the solar industry employed more than 250,000 workers, which is more than five times greater than employment of the coal industry.⁵⁷

Another key growth industry for energy jobs is energy storage, which includes battery, mechanical, and thermal storage. Jobs in this area could include construction and installation connecting energy storage to the electricity grid, manufacturers, and business support.⁵⁸

55 “Wages, Benefits and Change: A Supplemental Report to the Annual U.S. Energy and Employment Report,” USEnergyJobs.org, National Association of State Energy Officials, Energy Futures Initiative, and BW Research Partnership, 2020, <https://static1.squarespace.com/static/5a98cf80ec4eb7c5cd928c61/t/606d1178a0ee8f1a53e66206/1617760641036/Wage+Report.pdf>

56 U.S. Department of Energy, “Five of the Fastest Growing Energy Jobs in Clean Energy,” DOE Press Release, April 24, 2017, <https://www.energy.gov/eere/articles/5-fastest-growing-jobs-clean-energy>

57 Pearce, Joshua, “An Alternative to Propping up Coal Power Plants: Retrain Workers for Solar,” The Conversation, August 22, 2018, <https://theconversation.com/an-alternative-to-propping-up-coal-power-plants-retrain-workers-for-solar-101961>

58 “Wages, Benefits and Change: A Supplemental Report to the Annual U.S. Energy and Employment Report,” USEnergyJobs.org, National Association of State Energy Officials, Energy Futures Initiative, and BW Research Partnership, 2020, <https://static1.squarespace.com/static/5a98cf80ec4eb7c5cd928c61/t/606d1178a0ee8f1a53e66206/1617760641036/Wage+Report.pdf>

Jobs also could be created for coal plant workers in cleaning up coal ash. A 2021 report released by Earthjustice, which looked at three coal plant closures, found that cleaning up groundwater contaminated by coal ash rather than capping it in place create positive economic and environmental impacts in their communities.⁵⁹ Other opportunities for creating jobs with existing energy infrastructure include the conversion of refineries to biorefineries, leveraging industry expertise for safely producing hydrogen, developing CCUS projects, processing renewable natural gas, and creating smart system platforms for infrastructure.⁶⁰

Another area to highlight, particularly for workers currently employed by the coal industry, is recovering and processing rare earth elements (REEs) from coal and coal products. REEs are used for batteries in electric vehicles and other renewable energy products, cellphone components, computer hard drives, liquid crystal displays, magnets, catalysts, optical fibers, X-ray machines, nuclear fuel and weapons, and nuclear medicines. China currently produces most of the world's REEs (85 percent) and possesses about two-thirds of the global supply of rare metals and minerals. However, China is using most of what it produces domestically. As Chinese sources have diminished, world demand has increased. The U.S. government and many manufacturing companies are looking for new domestic sources of REEs, and one of those sources may be coal and coal waste. The Center for Applied Energy Research and Kentucky Geological Survey, both at the University of Kentucky, are testing Kentucky-mined coals and coal byproducts for their REE content and concentration to determine the potential for commercial extraction.⁶¹ In August 2021, DOE's National Energy Technology Laboratory (NETL) established the Carbon Ore, Rare Earth and Critical Minerals (CMs) Initiative. The goal of the program is to help energy communities to shift from fossil energy to produce the REEs and CMs needed to build renewable energy products such as wind turbines, solar panels, batteries, magnets and other products.⁶²

59 Lisa Evans and Kate French, "Cleaning up Coal Ash for Good: How Clean Closure of Coal Ash Impoundments Provides Jobs, Economic Benefits and Redevelopment Opportunities for Host Communities," EarthJustice, July, 2021, <https://earthjustice.org/sites/default/files/feature/2021/report-coalash/coal-ash-cleanup-report-earthjustice.pdf>

60 "Reflections on the Energy Transition: A Collection of Testimonies by Ernest Moniz," Energy Futures Initiative, (2021), <https://energyfuturesinitiative.org/efi-reports>

61 "Rare Earth Elements from Coal," University of Kentucky, Kentucky Geological Survey, <https://www.uky.edu/KGS/coal/coal-for-rare.php>

62 "Initiative to Create Jobs in Energy Communities Extracting Valuable Materials from Carbon Ore," NETL Website, August 16, 2021, <https://netl.doe.gov/node/11045>

5. Executive Order 14008 – Tackling the Climate Crisis at Home and Abroad

In response to the emerging challenges created by the U.S. energy transition, the Biden Administration issued EO 14008, “Tackling the Climate Crisis at Home and Abroad,” on January 27, 2021, establishing two initiatives to lead and assist power plant communities through the nation’s energy transition: the Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization and the Justice40 initiative.

5.1 Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization

As the first initiative, the EO established the Interagency Working Group (IWG) on Coal and Power Plant Communities and Economic Revitalization and directed the IWG to prepare an initial report describing “mechanisms, consistent with applicable law, to prioritize grantmaking, federal loan programs, technical assistance, financing, procurement or other existing programs to support and revitalize the economies of coal and power plant communities.”⁶³

In April 2021, the IWG published its initial report, moving the mandate set out in EO 14008 forward. At the outset, the Report identified 25 of the “most-impacted” regions/communities for coal-related declines to prioritize for investments in the near-term, and also identified the areas with the highest concentration of direct coal sector jobs.

Guiding Principles of the Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization

- Support Energy Workers by Securing Benefits and Providing Opportunity
- Provide Federal Investments to Catalyze Economic Revitalization
- Prioritize Pollution Mitigation and Remediation
- Create Good-Paying Jobs

Figure 5 shows the IWG’s assessment of communities in need of assistance, based on coal mine and power plant closures from 2005 to 2020 and the U.S. Bureau Labor Statistics Metro and Non-Metro Areas that are vulnerable to impacts from coal-specific job losses.⁶⁴ Many of the regions highlighted on the map were negatively impacted by coal mine and power plant closures over the past 15 years.

The findings of this report represent the IWG’s first steps toward advancing the mandate set forth in EO 14008. The Report also indicated that up to \$38 billion⁶⁵ in existing federal funding could support efforts in affected energy communities for union job creation, infrastructure, environmental remediation, and community revitalization efforts.⁶⁶ The report recommends short-term actions for federal agencies to address the loss of employment and revenue streams that coal-producing counties are currently experiencing.

Dr. Brian Anderson, director of the National Energy Technology Laboratory, and a native of West Virginia, serves as the IWG’s executive director. The IWG is looking at how to implement the Administration’s goals of net-zero electric emissions by 2030 and economy-wide decarbonization by 2050. As part of this strategy, there is a focus

63 “Tackling the Climate Crisis at Home and Abroad,” Executive Order 14008, January 27, 2021, Published in Federal Register on February 1, 2021, Volume 86, No. 19, <https://www.energy.gov/sites/default/files/2021/02/f83/eo-14008-tackling-climate-crisis-home-abroad.pdf>

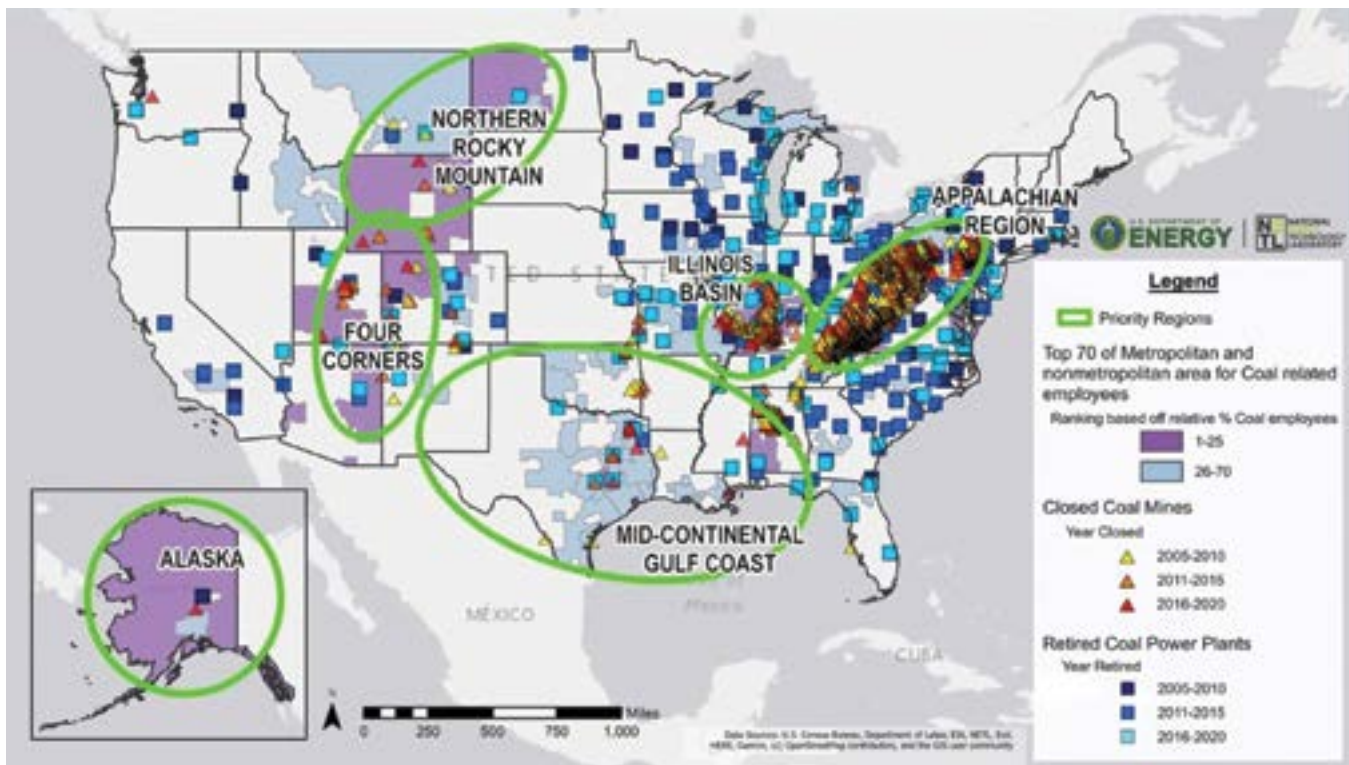
64 Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization, “Initial Report to the President on Empowering Workers Through Revitalizing Energy Communities,” April 2021, https://netl.doe.gov/sites/default/files/2021-04/Initial%20Report%20on%20Energy%20Communities_Apr2021.pdf

65 This funding includes over \$260 million in existing resources already mobilized by the Department of the Interior to support abandoned mine land reclamation, predominantly in Appalachia.

66 Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization, “Initial Report to the President on Empowering Workers Through Revitalizing Energy Communities,” April 2021, https://netl.doe.gov/sites/default/files/2021-04/Initial%20Report%20on%20Energy%20Communities_Apr2021.pdf

on ensuring that traditional fossil communities will have the resources to create family-sustaining careers. In support of this goal, the U.S. Department of Energy (DOE) will provide \$109.5 million for projects that support job creation in communities impacted by the energy transition, with a focus on communities impacted by the closure of coal mines and power plants.⁶⁷ In addition, the strategy calls for investments in carbon capture and hydrogen technologies to support low carbon industries. This includes \$75 million in funding for CCUS projects; \$19.5 million for critical minerals extraction from coal and coal waste streams (for manufacturing of batteries and other components of electric vehicles); and \$15 million for geothermal energy research.⁶⁸ As mentioned, the IWG report also identified \$38 billion in existing federal funding that could be accessed by coal communities to address infrastructure, environmental remediation, union job creation, and community revitalization.⁶⁹

Figure 5: Communities Vulnerable to Impacts from Fossil Job Losses



Map: National Energy Technology Laboratory, Research & Innovation Center, April 13, 2021

As part of the American Rescue Plan, on July 22, 2021, the U.S. Economic Development Administration (EDA) was allocated \$3 billion in funding to assist communities around the country to “build back better” from the economic downturn caused by COVID-19 and improve community resilience to future economic disruptions. As part of this funding, the EDA has earmarked \$300 million specifically for coal communities, coordinating with other federal agencies through the IWG. This includes \$200 million in economic adjustment assistance grants and \$100 million for the Build Back Better Regional Challenge.⁷⁰ EDA defines “coal communities” as regions that can demonstrate

⁶⁷ Proctor, Darrell, “DOE Earmarks \$109.5 Million to Support Coal Workers,” Power Magazine, April 23, 2021, <https://www.powermag.com/doe-earmarks-109-5-million-to-support-coal-workers/#:~:text=The%20U.S.%20Department%20of%20Energy,power%20plants%20and%20coal%20mines>

⁶⁸ Ibid.

⁶⁹ Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization, “Initial Report to the President on Empowering Workers Through Revitalizing Energy Communities,” April 2021, https://netl.doe.gov/sites/default/files/2021-04/Initial%20Report%20on%20Energy%20Communities_Apr2021.pdf

⁷⁰ U.S. Economic Development Administration, “EDA American Rescue Plan Programs,” <https://eda.gov/arpa/>

how changes in the coal economy have or will result in job losses in any coal reliant sector. This includes coal mining, coal-fired power plants, and related transportation, logistics, and supply chain-related industries.⁷¹

EDA's Economic Adjustment Program provides a range of grants in areas such as planning, workforce development, and entrepreneurship, as well as for public works and infrastructure projects.⁷² The Build Back Better Challenge provides a significant investment to 20 – 30 regions that are looking to revitalize their economies. This would include developing or increasing the capacity for regional industry clusters through planning, infrastructure, innovation, workforce development, and increased access to capital. The program will have two phases: Phase 1 would award 50 – 60 regional coalitions with \$500,000 in technical assistance funds to develop and support three to eight projects geared toward developing a regional growth cluster; Phase 2 will award 20 – 30 regional coalitions with between \$25 million to \$75 million (and potentially up to \$100 million depending on the project) to implement Phase 1 projects. As of September 2021, EDA was looking for eligible applicants to form regional coalitions and apply for Phase 1 funding that would cover three to eight projects in a region while coordinating with industry and community partners, with the intention to form an industry cluster.⁷³

5.2 Justice40 Initiative

The second initiative established by EO 14008 is the Justice40 Initiative, which directs 40 percent of federal climate and clean energy investments to disadvantaged and low-income communities. While this initiative remains in development, the White House Environmental Justice Advisory Council (WHEJAC), a public advisory committee, published a report in May 2021 which included a comprehensive set of recommendations to center environmental justice in national policies. Informed by public comments from affected energy communities, the report offers a roadmap to act on the Biden Administration's commitments to environmental justice and cut greenhouse gas emissions by as much as 52 percent of 2005 levels by 2030. Several recommendations provided in the report could also address many of the economic and environmental impacts coal-dependent communities are facing or will face in the near term.

WHEJAC Justice40 Interim Final Report – Select Recommendations Specific to Coal-Dependent Communities

- Expand the National Dislocated Worker Grants Program, providing an additional \$5.4 billion, to dislocated workers in coal communities;
- Extend the Work Opportunity Tax Credit to include employees in coal-impacted communities;
- Increase targeted workforce development and training programs for workers affected by coal facility closures;
- Pass the RECLAIM Act (H.R. 1733) to use mine reclamation as an economic driver. The RECLAIM Act would direct \$1 billion over five years to reclaim and repurpose abandoned mine lands (AML) sites for community and economic development; and
- Increase black lung benefits to provide immediate personal and local economic stimulus to coal communities.

71 U.S. Economic Development Administration, "EDA American Rescue Plan: Investing in America's Communities," Presentation by Michele Chang, at the Midwestern Governors Association Virtual Quarterly Meeting, July 28, 2021, <https://midwesterngovernors.org/power-plant-closures/>

72 U.S. Economic Development Administration, "Economic Adjustment Assistance: Providing the Building Blocks for Success," EDA Fact Sheet, https://eda.gov/files/arpa/one-pagers/EDA_ARPA_EAA-One-Pager.pdf

73 U.S. Economic Development Administration, "Build Back Better Regional Challenge: Supercharging Local Communities," EDA Factsheet, https://eda.gov/files/arpa/one-pagers/EDA_ARPA_BBB-One-Pager.pdf

On July 20, 2021, the Office of Management and Budget (OMB), in conjunction with the Council on Environmental Quality (CEQ) and WHEJAC, released an Interim Guidance that includes a set of actions that federal agencies must take to manage Justice40 programs. This includes identifying the benefits of covered programs; determining how covered programs distribute benefits; and calculating and reporting on reaching the 40 percent goal of the Justice40 Initiative. The guidance has several criteria for defining disadvantaged communities. Those relevant to the coal community include: low-income and persistent poverty; high unemployment and underemployment; distressed neighborhoods; and jobs lost through the energy transition.⁷⁴ The guidance also calls on federal agencies to determine which federal programs should be covered by the Justice40 Initiative. “Covered programs” include those that make investments in the areas of climate change, clean energy and energy efficiency, training and workforce development, remediation and reduction of legacy production, and critical clean water and waste infrastructure. The interim guidance also lists 21 programs that will be used to implement a Justice40 pilot program.⁷⁵

74 “Interim Implementation Guidance for the Justice40 Initiative,” Memorandum for the Heads of Departments and Agencies, Executive Office of the President, Office of Management and Budget, July 20, 2021, <https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf>

75 Ibid.

6. Federal Programs for Economic Revitalization and Workforce Recruitment and Training

Federal assistance from the Abandoned Mine Land (AML) program, which comes from fees imposed on coal-producing companies, could be reauthorized and expanded through passage of the RECLAIM Act.⁷⁶ In April 2021, Senate Energy and Natural Resources Committee members reintroduced legislation that would extend the AML program for 15 years. The legislation would provide a boost for coal reclamation projects that provide economic development and growth in communities impacted by the downturn of the coal industry. If passed, these bills would release \$1 billion from the Abandoned Mine Reclamation Fund to help diversify coal economies and provide cleaner air, water, and land.⁷⁷

In addition to the AML program, other federal economic development programs include the Partnerships for Opportunity and Workforce Revitalization (POWER) Initiative, which is administered by the Appalachian Regional Commission, as well as Assistance to Coal Communities (ACC), which is administered by the EDA. These programs offer grants for job training and other support for distressed communities.⁷⁸

In addition to the existing programs mentioned, federal policymakers could develop an energy transition adjustment assistance program that would be patterned after the U.S. Department of Labor's (DOL's) Trade Adjustment Assistance (TAA) program, which helps workers who have lost their jobs due to trade with other countries. This type of a program could incentivize employers to provide training for their workers as they shift to developing lower-carbon products; provide allowances for relocation and wage insurance; incorporate requirements for federally-funded projects such as local hiring; and provide sufficient assistance to positively impact the lives of all fossil fuel workers and their communities.⁷⁹ Another possibility could be a federal carbon tax with a portion of the revenue raised earmarked to provide assistance to coal communities.⁸⁰

In the U.S. House of Representatives, the Environmental Justice for All Act (HR 2021) was introduced in 2021. If passed, the legislation would assist transitioning workers and communities away from dependence on fossil fuels. It would also create a Federal Energy Transition Economic Development Assistance Fund that would be funded on fees from oil, gas, and coal companies with 70 percent of the funding distributed to states with traditional fossil fuel industries and the remainder distributed through competitive grants. Funding could be used for restoring land affected by extraction and mining, technical assistance, financial support for displaced workers, carbon sequestration projects on public lands, and expanding broadband. Funds could also be used for job retraining and apprenticeship programs, internships and academic programs in clean energy, and projects geared towards diversifying local economies and creating jobs in non-fossil industries.⁸¹

There are already several programs that are funded by the federal government that can be used to provide support to displaced and disadvantaged communities. These include providing career services, job training, direct support, and technical assistance. The primary federal agency responsible for these programs is the DOL's Employment and Training Administration (ETA). In 2014, Congress passed the Workforce Innovation and Opportunity Act, which reauthorized career services for adult, youth, and dislocated worker services

76 Saha, Devashree and Neuberger, Jillian, "Steps to Aid US Fossil Fuel Workers in the Clean Energy Transition," January 15, 2021, <https://www.wri.org/insights/steps-aid-us-fossil-fuel-workers-clean-energy-transition>.

77 "Manchin, Brown, Casey, Kaine and Warner Reintroduce Legislation to Invest and Restore Coal Communities. U.S. Senate Energy and Natural Resources Committee Press Release. April 29, 2021.

78 Ibid.

79 Ibid.

80 Adele C. Morris, Noah Kaufman and Siddhi Dosh, "The Risk of Fiscal Collapse in Coal-Reliant Communities," July 2019, https://www.brookings.edu/wp-content/uploads/2019/07/RiskofFiscalCollapseinCoalReliantCommunities-CGEP_Report_080619.pdf

81 Abby Neal. "Assistance to Fossil Fuel Dependent Communities Included in Environmental Justice Bill." Environmental and Energy Study Institute, March 27, 2020, <https://www.eesi.org/articles/view/assistance-to-fossil-fuel-dependent-communities-included-in-environmental-justice-bill>

(funded through state formula grants) as well as demographically targeted national programs.⁸² The ETA also runs an apprentice program that looks to place apprentices in high-growth industries, especially women and young adults. Some of the key features of the program includes paid work, both classroom and on the job learning, and mentorship. Participants in the program are awarded an industry recognized credential after completing the program. Another program that can be used is Job Corps, which looks to provide training for disadvantaged youths to support their employment, education, or enrollment in the military. Services include academic, employment and social skills training, technical on the job training; and counseling and social support services such as childcare.⁸³

As part of the POWER Initiative, which started in 2015, dislocated worker grant programs have been established in Kentucky, Ohio, and West Virginia. These programs retrain dislocated workers for jobs such as mechanics, heavy equipment operators, welding crane operators, wastewater operators, broadband technicians, and other information technology roles.⁸⁴ The UMW has also partnered with the DOL and Workforce West Virginia to support retraining through the National Dislocated Workers Grant program. The program would pay up to \$5,000 in costs for a training program.⁸⁵

82 Look, Wesley, Robertson, Molly, Higdon, Jake and Propp, Daniel, "Labor Policies to Enable Fairness for Workers and Communities in Transition," Resources for the Future and Environmental Defense Fund, March 2021, <https://www.rff.org/publications/reports/labor-policies-to-enable-fairness-for-workers-and-communities-in-transition/>

83 Ibid.

84 U.S. Department of Labor, "POWER Dislocated Worker Grants: Resources for Coal Miners," Division of Coal Mine Workers' Compensation, <https://www.dol.gov/agencies/owcp/dcmwc/powergrants>

85 "Training Available for Dislocated Coal Miners and Dependents," UMW Career Centers, Inc., <http://umwacc.com/training-available-for-dislocated-coal-miners-and-dependents/>

7. Community Involvement and Stakeholder Engagement

As a result of the energy transition, coal communities have suffered economic and job losses, which created ripple effects throughout entire communities, including impacts on families, teachers, local businesses, healthcare facilities, schools, infrastructure, and other community services.⁸⁶ As mentioned above, EO 14008 established the IWG, which is working to ensure that a shift to a clean energy economy will create good paying jobs, spur economic revitalization, remediate environmental degradation, and support energy workers in coal, oil and gas, and power plant communities around the country.⁸⁷

Following the release of its initial report in April 2021, the IWG hosted a series of virtual stakeholder engagement opportunities to gather feedback from energy communities and identify federal resources they can access. As of September 2021, these virtual events have been held for energy communities in Pennsylvania, West Virginia, Colorado, Arizona, North Dakota, and for the Navajo and Hopi communities, and have included officials from DOE, EDA, and the U.S. Department of the Interior. Nongovernmental organizations are also collaborating with community leaders and organizations to help them manage the funding and grants process and to offer technical assistance. The IWG also has been informing impacted communities of recent federal government funding announcements that have prioritized energy communities, including EDA's \$300 million Coal Communities Commitment to support economic revitalization, infrastructure investments, and quality jobs in coal communities, the USDA's investment of \$167 million in priority energy communities through the Renewable Energy for America Program (REAP) and the Electric Loan Program, and the Appalachian Regional Commission's announcement of its \$46.4 million grant awards to coal communities through the POWER program. These engagements will lead to partnerships with local communities such as regional planning groups and state economic development administrations.⁸⁸

In a 2021 report on prospects for renewable energy jobs in fossil communities, the Brookings Institution put forth recommendations to the Administration in order to ensure that these efforts are effective:

- Developing clear goals, metrics, and standards to assist workers in economically at-risk communities;
- Incentivizing targeted training efforts in communities currently reliant on fossil fuel industries with the potential to develop renewable energy hubs;
- Providing support for partnerships with educational institutions, labor and other community organizations;
- Coordinating efforts with state partners and companies to ensure that clean energy investments are made in these communities; and
- Using the national laboratories, such as NETL and the National Renewable Energy Laboratory (NREL), to hire from local communities.⁸⁹
- Creating, within the IWG, a community engagement subcommittee, an investments committee, an integration committee to review existing interagency activities and to establish a one-stop shop for

86 "How the Clean Energy Transition Affects Workers and Communities," Environmental Defense Fund, August 11, 2020) <https://www.edf.org/how-clean-energy-transition-affects-workers-and-communities>

87 Charles Young, "NETL's Brian Anderson has Plans to Revitalize West Virginia's Coal Communities," *The State Journal*, May 10, 2021, https://www.wvnews.com/statejournal/news/netls-brian-anderson-has-plans-to-revitalize-west-virginias-coal-communities/article_8d2da3b0-771b-58da-8a13-764e1e1272bd.html

88 Charles Young, "NETL's Brian Anderson has Plans to Revitalize West Virginia's Coal Communities," *The State Journal*, May 10, 2021, https://www.wvnews.com/statejournal/news/netls-brian-anderson-has-plans-to-revitalize-west-virginias-coal-communities/article_8d2da3b0-771b-58da-8a13-764e1e1272bd.html

89 Tomer et. al., "How Renewable Energy Jobs Can Uplift Fossil Communities," Brookings, https://www.brookings.edu/wp-content/uploads/2021/02/2021.02.22_BrookingsMetro_FossilFuel-MethodologyAppendix.pdf

energy communities to obtain federal resources, and a policy committee to focus on recommendations for long-term investments.⁹⁰

As closures of coal power plants have begun to be a large issue for many midwestern communities, Minnesota Governor Tim Walz, the current chairman of the Midwestern Governors Association (MGA), is spearheading an initiative called “Empowering Midwestern Communities.” The goal of this initiative is to engage state and local governments, community leaders, workers, and energy advocates to support workers through the energy transition.⁹¹ A recent MGA meeting featured a presentation from Briggs White, Deputy Executive Director of the IWG, as well as representatives from EDA, the U.S. Environmental Protection Agency (EPA), and USDA to discuss programs that communities with coal plant closures can use as resources.⁹²

States are already moving towards transitioning to a clean energy economy. Reports from the National Association of Regulatory Utility Commissioners (NARUC), Resources for the Future, and the Environmental Defense Fund provide discussion of federal and state initiatives to prepare for fossil closures and take steps to facilitate renewable energy workforce and infrastructure development.⁹³ Illinois, New Mexico, Colorado, and Minnesota offer examples of different approaches to these goals.

- In 2017, **Illinois** passed the Future Energy Jobs Act (FEJA). The passage of this legislation spurred the development of several renewable energy projects in the state, including more than 2,000 MW of solar. Although investments in renewable energy in Illinois have increased, the state’s fossil fuel workforce is still large; in 2019, it accounted for approximately 8,000 jobs. A key part of FEJA was funding for job training programs designed to promote environmental justice. As part of this focus, three programs were created: the Solar Training Pipeline Program, Craft Apprenticeship Program, and Multicultural Job Training Programs. These programs are focused on training underserved groups in economically disadvantaged communities. Although these programs have been successful, they have not been as impactful as they could be for workers affected by power plant closures. The Clean Energy Jobs Act, which is proposed legislation, includes a “Displaced Energy Workers Bill of Rights,” which includes provisions such as advanced notice of closure, financial advice, continued healthcare and retirement packages, and tuition scholarships at Illinois state universities, community colleges, and trade programs. It also calls for communities with coal power plant closures to be designated as “Clean Energy Empowerment Zones,” which would make them eligible for a five-year tax base replacement and incentives for clean energy investments.⁹⁴ In September 2021, Illinois passed another major climate bill, SB2408, which charts a path to 100 percent clean energy by 2050 and ensures equity is prioritized in the just transition to a clean economy. The bill combats climate change and invests in renewable energy and workforce development, establishes transition programs and assistance, ensures consumer protections are at the forefront, and sets to establish Illinois as a clean transportation leader.⁹⁵

90 Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization, “Initial Report to the President on Empowering Workers Through Revitalizing Energy Communities,” April 2021, https://netl.doe.gov/sites/default/files/2021-04/Initial%20Report%20on%20Energy%20Communities_Apr2021.pdf

91 Jeff Ewart, “Minnesota Governor Tim Walz Announces His MGA Chair’s Agenda – Empowering Midwestern Communities,” Midwestern Governors Association Press Release, October 15, 2020, <https://midwesterngovernors.org/chairs-agenda/>

92 See the Midwestern Governors Association website to see meeting materials, <https://midwesterngovernors.org/power-plant-closures/>

93 See Kiera Zitelman and Jasmine McAdams, “The Role of State Utility Regulators in a Just and Reasonable Energy Transition: Examining Regulatory Approaches to the Economic Impacts of Coal Retirements,” National Association of Regulatory Utility Commissioners, 2021 and Daniel Raimi, Wesley Look, Molly Robertson, and Jake Higdon, “Economic Development Policies to Enable Fairness for Workers and Communities in Transition.” Resources for the Future and Environmental Defense Fund, August 2020, <https://media.rff.org/documents/fairness-for-workers-1.pdf>

94 “Illinois Envisions a Just Transition for Displaced Fossil Workers,” ClimateXChange, December 17, 2020, [https://climate-xchange.org/2020/12/17/illinois-envision-a-just-transition-for-displaced-fossil-fuel-workers/#:~:text=Illinois%20Envisions%20a%20Just%20Transition%20for%20Displaced%20Fossil%20Fuel%20Workers,-December%2017%2C%202020&text=In%20states%20like%20Illinois%2C%20America%27s,Energy%20Jobs%20Act%20\(FEJA\)](https://climate-xchange.org/2020/12/17/illinois-envision-a-just-transition-for-displaced-fossil-fuel-workers/#:~:text=Illinois%20Envisions%20a%20Just%20Transition%20for%20Displaced%20Fossil%20Fuel%20Workers,-December%2017%2C%202020&text=In%20states%20like%20Illinois%2C%20America%27s,Energy%20Jobs%20Act%20(FEJA))

95 “Gov. Pritzker Signs Transformative Legislation Establishing Illinois as a National Leader on Climate Action,” Press Release, Illinois.gov, September 15, 2021, <https://www.illinois.gov/news/press-release.23893.html>

- **New Mexico** passed the Energy Transition Act (SB 489) in 2019. The bill sets a target of zero emissions from electric generation by 2045 for utilities and 2050 for electric cooperatives. In addition, utilities must phase out their coal plants by 2023 (2032 for electric cooperatives). To support the communities and workers that would be affected by these closures, the state has established three funds: the Indian Affairs Fund, the Economic Development Assistance Fund, and the Displaced Worker Fund. The state agencies administering these programs are required to hold public meetings to gather input.⁹⁶
- In **Colorado**, an Office of Just Transition (OJT) was created by the General Assembly in 2020. It is part of the “Colorado Just Transition Action Plan,” which reflects the input of stakeholders, state agencies, and the public. Goals of the Office include assisting communities with more family-sustaining jobs, a broader property tax base, and more economic diversity and assistance for workers who are laid off from the coal industry to secure new jobs. The plan also includes efforts to identify funding from public and private sources to finance these programs.⁹⁷ In terms of community strategies, the plan focuses on aligning state and federal programs to provide assistance for local strategies; targeting early successes in business start-ups, expansions, retention, and attraction; empowering communities with resources to drive their own economic transitions; coordinating infrastructure investments to support local and regional transition strategies; identifying and supporting state, regional and local institutions to facilitate needed investments; and attracting grants and investments to power local economic growth. Workforce strategies include empowering workers and their families to plan early for future success; encouraging the federal government to lead with a national strategy for energy transition workers; preparing a detailed state program to help displaced workers build skills, find good jobs, or start their own businesses; and exploring strategies to protect family economic security throughout the transition.⁹⁸
- **Minnesota** is currently in a transition from coal-fired generation to cleaner sources of energy. The Minnesota Pollution Control Agency developed a mapping tool to predict how the transition will impact communities. Some of the conclusions to date show that there are reduced power plant emissions in areas of concern for environmental justice now than there have been in the past as Minnesota utilities are retiring coal plants in favor of natural gas and renewables.⁹⁹ In its proposed IRP, filed with the Minnesota Public Service Commission, Minnesota Power has been reducing its use of coal-fired generation and plans to shut down its remaining coal plants by 2035 to achieve net-zero carbon emissions by 2050. The utility is looking to replace coal generation by potentially converting plants to natural gas or biomass, as well as with new solar and wind generation.¹⁰⁰

The Just Transition Fund is a leading national non-profit active in energy transition planning and assistance to impacted coal communities. The group offers grants and technical assistance to communities impacted by the energy transition. As part of this assistance, the group has developed a Blueprint of Just Transition, which serves as a comprehensive resource for coal communities and their local leaders to create an equitable, sustainable, and inclusive future.¹⁰¹ They list four key steps for developing a plan. These include taking stock of the community’s capacity for transition planning and the impacts of the closures and challenges that exist; engaging all partners and community stakeholders to help establish measurable goals; building a

96 Raimi, Daniel, Look, Welsley, Robertson, Molly and Higdon, Jake, “Enabling Fairness for Energy Workers and Communities in Transition,” Resources for the Future and Environmental Defense Fund, August 2020, <https://www.rff.org/publications/reports/enabling-fairness-for-energy-workers-and-communities-in-transition/>

97 “Colorado Just Transition Action Plan,” Colorado Department of Labor and Employment, December 31, 2020, <https://cdle.colorado.gov/sites/cdle/files/documents/Colorado%20Just%20Transition%20Action%20Plan.pdf>

98 Ibid.

99 “Environmental Justice and Electricity Generation in Minnesota,” Minnesota Pollution Control Agency, <https://www.pca.state.mn.us/air/environmental-justice-and-electricity-generation-minnesota>

100 Brooks Johnson, “Minnesota Power Shutting, Converting Final Two Coal Plants by 2035,” *Star Tribune*, January 12, 2021, <https://www.startribune.com/minnesota-power-shutting-converting-final-two-coal-plants-by-2035/600009603/>

101 “Blueprint for Just Transition,” Just Transition Fund, <https://www.justtransitionfund.org/blueprint>

roadmap for action and determining milestones; and implementing the plan. With respect to the federal government, it lists the key agencies that communities can seek federal government assistance. This includes the Appalachian Regional Commission, Small Business Administration, USDA's Rural Development programs, DOL, EDA, and EPA.¹⁰²

A 2016 paper, published by the Political Economy Research Institute (PERI), suggests that developing a Just Transition Framework for communities that are currently reliant on fossil energy production would cost approximately \$600 million per year. This money would provide funding for retraining and relocation support; guaranteeing pensions for dislocated workers; and the development of training programs. One factor that would keep these costs relatively modest is the assumption that large-scale clean energy investments are being made at the same time.¹⁰³

In 2018, a group called the Delta Institute, which partners with Midwestern communities to solve complex environmental challenges and receives funding from the Just Transition Fund, developed a roadmap to help communities plan for coal plant closures, facilitate stakeholder engagement, and formulate a redevelopment process that will benefit the community. The roadmap has five key actions: building a redevelopment and transition plan; assessing environmental and economic impacts; determining site challenges and opportunities; planning an engagement strategy; and developing reuse plans from a shared community vision.¹⁰⁴

¹⁰² Ibid.

¹⁰³ Pollin, Robert and Callaci, Brian, "The Economics of Just Transition: A Framework for Supporting Fossil Fuel Dependent Workers and Communities in the United States," Political Economy Research Institute, University of Massachusetts Amherst, October 13, 2016, <https://peri.umass.edu/publication/item/762-the-economics-of-just-transition-a-framework-for-supporting-fossil-fuel-dependent-workers-and-communities-in-the-united-states>

¹⁰⁴ "Coal Plant Redevelopment Roadmap: A Guide for Communities in Transition," Delta Institute, May 2018, <https://delta-institute.org/wp-content/uploads/2018/05/Coal-Redevelopment-Roadmap-5-2-18.pdf>

8. Concluding Remarks

The shift away from coal as a primary source of electricity generation has led to significant job losses and economic downturn in fossil-dependent communities that are struggling to maintain services and businesses. Although workers and communities have suffered and are facing an uncertain future as the coal industry declines, federal, state, and local governments have been looking for solutions to help impacted communities and dislocated workers to move to other industries, e.g., jobs in the clean energy sectors, by creating and implementing programs, and allocating funding and resources.

During the transition to clean energy sources and efforts to decarbonize the power generation sector, there is a growing need for a trained and educated workforce to support growing renewable and other industries in the clean energy economy. The federal government is taking action to support these disproportionately impacted communities, establishing programs, and allocating resources and funds to assist workers and their communities. Empowering displaced coal workers with training and investing in their communities can provide the resources needed to support and foster a clean energy future. If federal, state, and local governments continue to collaborate to address detrimental impacts of the transition on energy communities, the shift to a clean energy economy can create jobs, foster economic revitalization, and support energy workers in coal mining and coal-fired power plant communities across the country.



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