The Local Social and Economic Context of Energy Transitions

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Introduction

The world is currently undergoing a major transition from fossil fuels to lower-carbon resources. This transformation of the energy sector is occurring due to economic competition—renewable energy is now cheaper than most other forms of energy[2]—and government policies. The transition will be more rapid in some places than others, and there is no single recipe for how it will play out. Indeed, in some areas the transition is moving in the opposite direction. For example, some countries are expanding coal production for export or building new coal-fired power plants.[3] On the opposite end of the spectrum, other countries are shifting aggressively and rapidly toward zero-carbon energy. For example, Denmark already supplies 50 percent of its electricity from solar and wind generation.[4]

Additionally, even in areas where the transition tends to be toward lower-carbon resources, different parts of the globe differ in their resource mix and their policy approaches to bolstering communities and workers impacted by the shifting energy economy. For example, as coal mines close in China, the government relocates workers to other still-active coal mines or other industries while also striving to reduce overall dependence on coal.[5] In Australia,

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[2] U.S. ENERGY INFO. ADMIN., LEVELIZED COSTS OF NEW GENERATION RESOURCES IN THE ANNUAL ENERGY OUTLOOK 2021 7 (Feb. 2021), https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf (showing onshore wind as the lowest-cost form of electricity in the United States, even excluding tax credits).

[3] *See, e.g.*, JEAN-FRANCOIS SEZNEC & SAMER MOSIS, ATLANTIC COUNCIL GLOBAL ENERGY CENTER, THE ENERGY TRANSITION IN THE ARAB GULF: FROM VISION TO REALITY 6 (2021), https://www.atlanticcouncil.org/wp-content/uploads/2021/08/AC_GulfTransitions_FINAL.pdf (noting Dubai's "build-out of a new, massive coal plant); *Indonesia Coal Production*, CEIC, https://www.ceicdata.com/en/indicator/indonesia/coal-production (last visited Feb. 28, 2022) (noting that Indonesia's coal production reached "an all-time high" in 2019); Fransiska Nangoy, *Indonesia's Higher Coal Output Target Thwarted by Heavy Rains*, REUTERS (Oct. 18, 2021), https://www.reuters.com/business/energy/indonesias-higher-coal-output-target-thwarted-by-heavy-rains-2021-10-18/ (noting that Indonesia set a record target of 625 million tons of coal production in 2021).

[4] *Pioneers in Clean Energy*, MINISTRY OF FOREIGN AFFAIRS OF DEN., https://denmark.dk/innovation-and-design/clean-energy (last visited Feb. 28, 2022).

[5] RACHEL RONG, JUST TRANSITION IN CHINA: HOW DID CHINESE SOEs AVOID MASSIVE UNEMPLOYMENT WHILE REDUCING COAL CAPACITY (2015-2020) (2020) (masters thesis, Duke University), https://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/20623/MP_Rachel%20Rong.pdf?sequence=1&isAllowed=y

provincial governments have tended to provide financial support for unemployed coal workers and new economic development initiatives rather than directly finding new jobs for workers.[6] And in North Rhine-Westphalia, Germany, the state partnered with local governments, universities, workers, and other private actors to create vocational training programs and transform former mines and steel factories to tourist destinations.[7] The German government also provides direct monetary support to coal workers who lose their jobs as a result of the country's coal phase-out legislation.[8]

In the United States, the transition is playing out quite differently down to the most localized municipal level. Some variations are regional and political; others are urban and rural; and still others emerge from more granular community-specific factors. Despite these differences, there are several major, common components of the U.S. energy transition. First, some energy industries are in decline—particularly the coal industry. Many coal mines and coal plants are shrinking or exiting the market. Figure 1 shows the substantial decline in U.S. coal mining jobs in the past decade, much of which is due to automation, and some of which is due to coal mine closures.[9]

(noting that "some prefectures opened more new and bigger coal mines even as they closed older and smaller ones"): The Ministry of Human Resources and Social Security, **人力**资源社会保障部 **国家**发展改**革委等七部**门**关于在化解**钢铁煤炭行业过剩产能实现脱困发展过程中做好职工安置工作的意见, http://www.mohrss.gov.cn/xxgk2020/fdzdgknr/zcfg/gfxwj/jy/201604/t20160413_238000.html (roughly translated as "Opinions on Doing a good Job of Staff Placement in the Process of Eliminating the Overcapacity in the Iron and Steel Industry and Realizing Development" (Apr. 7, 2016) (describing Chinese worker re-allocation policies for mines; translated and summarized by Jiajie Song for Hannah Wiseman, Nov. 2021); Special Awards and SUPPLEMENTARY FUNDS FOR STRUCTURAL ADJUSTMENT OF INDUSTRIAL ENTERPRISES, NOTICE OF ADMINISTRATIVE MEASURES, MINISTRY OF FIN. OF PEOPLE'S REPUBLIC OF CHINA, (Aug. 20, 2018) http://jjs.mof.gov.cn/zhengcefagui/201809/t20180920_3023919.htm (providing $1 billion to finance workforce reallocation).

[6] *See, e.g.*, John Wiseman et al., *Prospects for a Just Transition Away from Coal-Fired Power Generation in Australia: Learning from the Closure of the Hazelwood Power Station* (Austl. Nat'l. U., Crawford Sch. of Pub. Pol'y., CCEP Working Paper No. 1708, 2017), https://ccep.crawford.anu.edu.au/files/uploads/ccep_crawford_anu_edu_au/2017-11/wiseman_campbell_green_prospects_for_a_just_transition_away_from_coal-fired_power_generation_in_australia_ccep_wp1708.pdf (describing the Victorian government's $22 million of funding for worker assistance and the formation of an economy authority to assist with "economic transition strategies").

[7] Stephanie Campbell et al., *Transitioning Beyond Coal: Lessons from the Structural Renewable of Europe's Old Industrial Regions* 9 (Austl. Nat'l U., Crawford Sch. Of Pub. Pol'y., CCEP Working Paper No. 1709, 2017), https://coaltransitions.files.wordpress.com/2017/11/australian-coal-transition-industrialization-final.pdf.

[8] *Germany: Law on Phasing -Out Coal-Powered Energy by 2038 Enters into Force*, U.S. LIBR. OF CONG. (Aug. 31, 2020), https://www.loc.gov/item/global-legal-monitor/2020-08-31/germany-law-on-phasing-out-coal-powered-energy-by-2038-enters-into-force/.

[9] *See, e.g.*, Devashree Saha & Sifan Liu, *Increased Automation Guarantees a Bleak Outlook for Trump's Promise to Coal Miners*, THE BROOKINGS INST. (Jan. 25, 2017), https://www.brookings.edu/blog/the-avenue/2017/01/25/automation-guarantees-a-bleak-outlook-for-trumps-promises-to-coal-miners/.

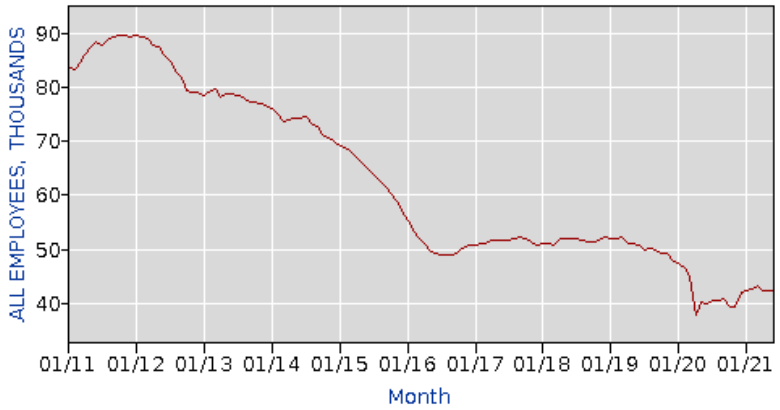

Figure 1. *Coal mining—all U.S. employees, January 2011- January 2021.*[10]

A second trend that defines the energy transition is that low-carbon energy sources—particularly wind and solar generation—are on the rise. Developers are constructing some of these sources within the communities that are phasing out fossil fuels, but many low-carbon energy sources are in communities that have not previously experienced extensive energy development.[11] Figure 2 highlights the recent growth of solar and wind energy generation in the United States and the projected increase in new renewable generation additions through 2050.

[10] Databases, Tables & Calculators by Subject, U.S. BUREAU OF LAB. STATS., https://data.bls.gov/timeseries/CES1021210001 (data extracted on Feb. 28, 2022, 8:56 PM).

[11] In still other cases—as in Pennsylvania, for example—communities that have experienced natural gas development (a fossil fuel that is not currently being phased out on a large scale) are now facing proposals for numerous solar farms.

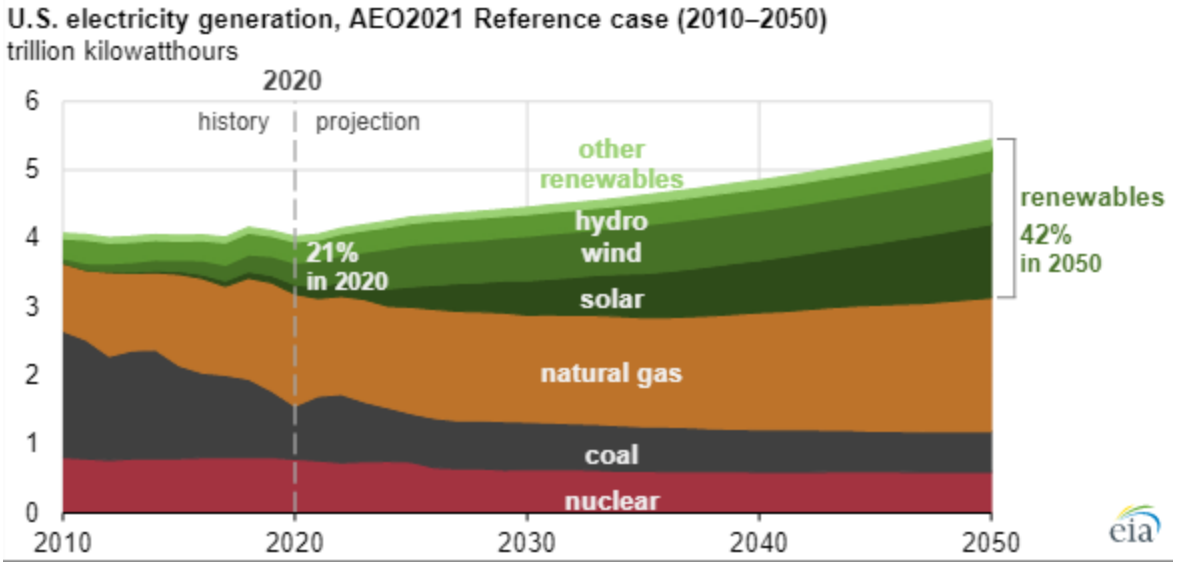

Figure 2. *Growth and projected growth of solar and wind generation in the United States.*[12]

A third theme of the U.S. energy transition is that governments are taking different approaches to the transition and its impacts. These approaches differ in terms of scale and the level of governance at which they are occurring. Governments are enacting transition-related policies simultaneously at the federal, state, and local levels, and policies range from transitioning large, utility-scale power plants to small household appliances. Additionally, some governments are focusing more on the impacts of the transition out of necessity—addressing declining jobs and tax bases, for example—whereas others are working to jumpstart the transition or accelerate it while also addressing the attendant impacts.

In several of the case studies explored here, local decisionmakers are acting beneath state policy measures that have promoted new power generation technologies. In some cases, state governments have also constrained the boundaries within which local governments may work toward a transition. For example, many states have preempted local government bans on natural gas appliances in new homes and businesses, and some have preempted local moratoria and bans on gas drilling.[13] Other states are pushing all actors within state boundaries, from industry to local governments, to hasten the transition to low-carbon energy sources. For example, California's new energy efficiency code requires new single-family homes to be "electric ready,"

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[12] *EIA Projects Renewables Share of U.S. Electricity Generation Mix Will Double by 2050*, U.S. ENERGY INFO. ADMIN. (Feb. 8, 2021), https://www.eia.gov/todayinenergy/detail.php?id=46676.

[13] *See* Building permits; utilities; restrictions; prohibitions, Ariz. H.B. 2686 (2020), https://legiscan.com/AZ/text/HB2686/id/2133241/Arizona-2020-HB2686-Engrossed.html (banning local laws that "prohibit or have the effect of restricting a person's or entity's ability to use the services of a utility provider," and defining "utility service" to include "natural gas, including propane gas"); Prohibiting municipalities from imposing restrictions on customer's use of energy based upon source of energy, Kansas S.B. No. 24 (2021) (prohibiting municipal laws from restricting or otherwise limiting "an end use customer's use of a public utility based upon the source of energy to be delivered to such customer"); Titus Wu, *Prohibition on natural gas bans, legal COVID-19 immunity for nursing homes becomes Kansas Law*, THE TOPEKA CAP.-J. (Apr. 12, 2021), https://www.cjonline.com/story/news/state/2021/04/12/energy-choice-act-natural-gas-bans-kansas-nursing-homes-covid-immunity-politics-legal-renewable/7188926002/ ("The governor didn't sign or veto the Energy Choice Act, merely letting it become law."); Hannah J. Wiseman, *Disaggregating Preemption in Energy Law*, 40 HARV. ENV'T. L. REV. 293, 296 (2016) (describing state preemption of local regulation of a ban on hydraulic fracturing for gas and oil).

requires solar panels and energy storage capabilities in most new commercial buildings, and establishes heat pumps as the default technology to meet energy efficiency standards.[14]

Figure 3 shows state requirements (mandates) and goals for the percentage of energy within the state that must come from renewable energy and other zero-carbon sources. One notable trend from this map is that mandates and goals for renewable and low-carbon energy do not neatly follow the "red, blue, and purple" lines on U.S. political maps describing predominantly Republican, Democratic, or mixed states. Furthermore, it is important to note that some states boast large renewable energy sectors despite having relatively weak policies, or no policies, addressing renewable energy. For example, Oklahoma is one of the U.S. leaders in installed wind energy capacity, second only to Iowa and Texas, yet Oklahoma only has a renewable energy goal rather than a mandate.[15]

[14] *2022 Building Energy Efficiency Standards*, CAL. ENERGY COMM'N, https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency (last visited Feb. 28, 2022).
[15] *U.S. Installed and Potential Wind Power Capacity and Generation*, U.S. DEP'T OF ENERGY, https://windexchange.energy.gov/maps-data/321 (last visited Feb. 28, 2022).

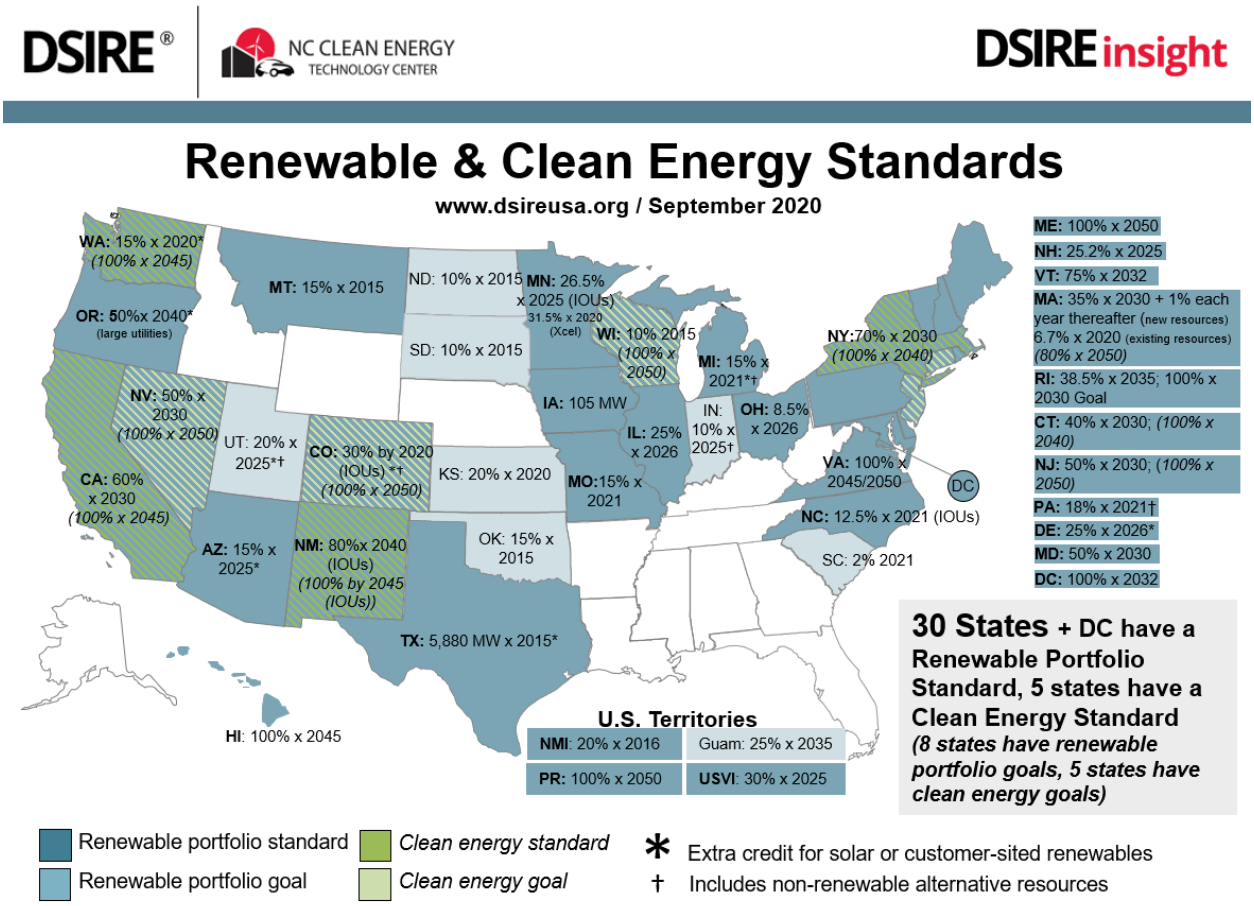

Figure 3. *States mandates and goals for renewable and clean energy.*[16]

In May 2021, the Penn State Center for Energy Law & Policy hosted a two-day virtual workshop that endeavored to pinpoint some of the place-based differences among U.S. energy transitions and to explore common energy transition themes. The goal was to gain a better understanding of how the transition is beginning to play out within different parts of the United States, the types of economic and social issues that government officials are grappling with, and the most important questions that remain unaddressed from an academic and policy perspective. The workshop also aimed to encourage the cross-pollination of ideas among policymakers.

Workshop speakers included local government officials and employees, state agency employees, heads of economic development agencies, and members of research institutions dedicated to issues associated with the energy transition. The speakers represented urban and rural areas in seven states, including Colorado, Kansas, New Mexico, Oregon, Pennsylvania,

[16] *Renewable & Clean Energy Standards*, DATABASE OF STATE INCENTIVES FOR RENEWABLE ENERGY (Sept. 2020), https://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2020/09/RPS-CES-Sept2020.pdf. The blue shades on the map represent requirements or goals for renewable energy in the state, with dark blue representing mandates and light blue representing non-mandatory goals. The green shades on the map represent state requirements for clean energy—a broader category than renewable energy that requires low- or zero-carbon energy of some form, including nuclear in some states. Darker green "standards" are mandatory, while lighter green "goals" are not mandatory. States with overlapping blue and green colors have both renewable portfolio standards and clean energy standards or goals.

Texas, and Wyoming. The workshop also engaged academic experts on the energy transition as listeners and discussants. Appendix A includes a full list of speakers and discussants and their affiliations.

This white paper summarizes three key place-based themes that emerged from the workshop, highlighting these themes with short case studies. Two of the themes involve policy approaches to new economic growth, including leveraging existing infrastructure or engaging in more of a reinvention of local economic opportunities. We emphasize that these are not wholly distinct approaches, however. Many communities utilized both strategies as they experienced substantial growth of the renewable energy sector or reductions in fossil fuel-based jobs. The third theme focuses on the multi-layered nature of the U.S. energy transition, in which federal, state, and local policies interact. The paper explores how some local governments are largely aligned with their states in terms of their future energy trajectory, although they do not consistently receive the financial or technical support from the state that might ease their energy transition approaches. In other cases, local governments are moving in directions that directly conflict with state policies, in which case these governments attempt to navigate pathways to a transition that are not preempted by state law.

Part I of this paper explores how some communities previously dominated by the coal sector are endeavoring to leverage existing infrastructure and expertise to support new economic growth. Part II analyzes other communities' efforts to wholly transform their economy in the context of the energy transition, encouraging residents to pursue promising business opportunities that are not yet present within the communities. Finally, Part III examines local governments' varied approaches to the energy transition in light of differing levels of state engagement with the transition.

I. Leveraging Existing Resources to Foster New Economic Growth

Communities previously dominated by the coal industry face substantial challenges in terms of regrowing their economies and supporting comparable jobs for displaced workers. In places such as Wyoming and New Mexico, the fossil fuel industry has been a major employer and contributor to the state economy. Coal represented approximately 70 percent of the GDP of Wyoming in 2014, and fossil fuel extraction comprises nearly one-third of New Mexico's government revenue. Fossil fuels continued to be the largest contributor to Wyoming's GDP in subsequent years, although their significance has begun to decline.[17] Fossil fuel extraction supported or previously supported schools, healthcare, and other vital government functions in these states and within tribal jurisdictions. The challenge for states and local governments is how to encourage new economic growth that continues to provide needed revenue and employ workers in high-quality jobs. Jobs within the coal industry tend to offer relatively high pay for workers with high school degrees. For example, miners who are members of the United Mine Workers of America make on average $61,000 annually, or $85,000 with overtime.[18] According

[17] *See* Petroleum Assn. of Wyoming, https://pawyo.org/facts-figures/ (showing oil and gas GDP in Wyoming far exceeding travel and tourism and agriculture),; Energy Info. Admin., Wyoming State Energy Profile, https://www.eia.gov/state/print.php?sid=WY#10 (noting in 2019 that "[m]ining and oil and gas extraction are the biggest contributors to Wyoming's gross domestic product").

[18] *See* Hiroko Tabuchi, *Coal Jobs Prove Lucrative, but Not for Those in the Mines*, N.Y. TIMES (May 2, 2017), https://www.nytimes.com/2017/05/02/climate/coal-jobs-prove-lucrative-but-not-for-those-in-the-mines.html#:~:text=Glenn%20Kellow%2C%20the%20coal%20executive,award%20valued%20at%20%2410%20million (quoting statistics from Phil Smith, a spokesman for the United Mine Workers of America).

to the Bureau of Labor Statistics, underground mining loading and moving machine operators make an average of $59,350 annually; earth drillers, blasters, and explosives workers make an average of $60,650 annually; and surface mining excavating and loading machine and dragline operators make an average of $60,420 annually.[19]

For communities whose coal mines are closing or shrinking, there are a variety of approaches for stimulating new economic growth. Many closed mines require environmental clean-up. The Western Organization of Resource Councils estimates that over the two or three years following surface mine closure, mine reclamation could require "between 6,081 and 12,161 jobs" in "Colorado, Montana, Navajo Nation, Hopi Tribe, Arizona, New Mexico, North Dakota, Utah, and Wyoming lands."[20] Reclamation uses much of the same equipment used for coal mining, thus allowing coal workers to switch relatively seamlessly to reclamation jobs.[21] Commencing reclamation immediately upon mine closure ensures that workers previously employed by the mine are hired for reclamation, as workers can bargain with the mine owner for this transition.[22] Reclamation requires fewer jobs than mining, however, so only a small percentage of workers are kept on.[23] Environmental *remediation* of abandoned mine sites, on the other hand, can create more jobs.[24]

States and communities have other options to create jobs for workers not included in the reclamation effort or where reclamation isn't possible. Creation of these jobs generally takes one of two basic approaches: (a) leveraging existing infrastructure, talent, and place-based resources to expand other existing, non-coal industries or support new ones, or (b) leveraging existing infrastructure and resources to encourage growth well beyond existing local industries. Sheridan, Wyoming, and Routt County, Colorado, represent a blend of both approaches, but we examine these areas as a case study of the former approach—expanding existing non-coal industries while also leveraging existing resources and infrastructure to support new growth.

A. Leveraging Existing Infrastructure, Talent, And Place-Based Resources to Expand Other Existing, Non-Coal Industries or Support New Ones

Several of the case studies in our workshop highlighted communities' efforts to build from existing local infrastructure and talent in the fossil fuel sector to support new economies. Several sub-themes emerged within these case studies, including different levels of state support for these local endeavors. For example, Colorado and New Mexico have state energy transition agencies that provide some support to communities, whereas Wyoming lacks this type of top-

[19] *May 2020 National Industry-Specific Occupational Employment and Wage Estimates*, U.S. BUREAU OF LAB. STATS., https://www.bls.gov/oes/current/naics4_212100.htm (last modified Mar. 31, 2021).
[20] W. ORG. OF RES. COUNCILS, COAL MINE CLEANUP WORKS: A LOOK AT THE POTENTIAL EMPLOYMENT NEEDS FOR MINE RECLAMATION IN THE WEST 4 (2020), http://www.worc.org/media/Reclamation-Jobs-Report-FINAL_Nov-2020.pdf.
[21] *Id*. at 6.
[22] *Id*.
[23] *Id*.
[24] *See, e.g.*, FRANK ACKERMAN & TYLER COMINGS, SYNAPSE ENERGY ECONS., INC., EMPLOYMENT AFTER COAL: CREATING NEW JOBS IN EASTERN KENTUCKY 10 (2015), https://www.synapse-energy.com/sites/default/files/Jobs-in-Eastern-Kentucky.pdf (estimating 4.8 direct jobs created per $1 million of spending for environmental remediation).

down institution.[25] Additionally, some areas are finding potential job opportunities for former fossil fuel workers in emerging areas such as carbon capture and sequestration or methane capture, whereas others are looking well beyond the energy sector.

1. Sheridan, Wyoming

Sheridan has a long history of coal mining dating back to the 1890s.[26] Therefore, any transition away from coal requires careful attention to cultural challenges, as Sheridan has been a "coal town" for more than a century. As an example of the embedded coal culture, Jay Stender, Principal of the Wyoming Ranch energy hub, reports that residents viewing a presentation fora potential local solar project responded by asking why a coal town would be considering renewable energy.

Sheridan currently has two active mines, but one is in bankruptcy.[27] The town also operates against the backdrop of declining coal jobs throughout the state. In 2021, coal jobs in Wyoming declined 28.7% from 2019, to representing a statewide loss of 5,900 jobs.[28] Taxable revenues from oil, gas, and coal in Wyoming declined by 63.1 percent between 2019 and 2020.[29]

In attempting to expand its economy beyond coal, Sheridan intentionally recruited workers and employers, focusing on manufacturing, professional development, and recreational opportunities (and not on agriculture or tourism) for those moving to the area. As part of this strategy, Sheridan worked to identify and build from its existing strengths, which included the following:

1) Low taxes and costs as compared to other areas, such as Colorado;
2) Competitive workable wage;
3) Existing specialized manufacturers and professional services firms;
4) Available "recruitment" properties for businesses looking for a place to locate, including "shovel-ready" sites; and
5) A sense of place and quality of life: a safe place offering extensive recreational opportunities and a mountain environment that would potentially attract new businesses and workers.

Beyond identifying and working toward new economic and job opportunities, Sheridan focused on its quality of life advantage to workers potentially relocating to the area. For example, managers from an industrial manufacturer/engineering firm stated: "Sheridan is a place I can recruit talent that will stay due to the location."[30]

Sheridan followed a strategy that aimed to leverage all of these resources, focusing particularly on the importance of constructing clusters that support a network for skilled blue collar workers. Its existing professional services and manufacturing firms sought new markets in 2010, and these firms have now entered new market sectors and increased their workforce by 30

[25] Colorado HB 19-1314; New Mexico Energy Transition Act Advisory Committee, https://www.dws.state.nm.us/ETA.
[26] Jay Stender, Principal, The WY Ranch, Presentation at the Penn State Solar Law Symposium (May 25, 2021).
[27] *Id*.
[28] *Id*.
[29] Wyoming Dept. of Admin. & Info., Economic Summary: 4Q2020 at 2 (2021), http://eadiv.state.wy.us/wef/Economic_Summary4Q20.pdf.
[30] Stender, *supra* note 26 (paraphrasing this quotation in a workshop presentation).

percent. Four knowledge-based software entities are now established in the area. To further expand the local economy, Sheridan has continued workforce training—thus helping workers formerly in coal jobs to potentially take advantage of the new job opportunities in Sheridan—and recruitment of manufacturers. Sheridan is also working to maintain airplane service to the area, expand broadband, and continue to repurpose both existing facilities and worker skills to serve new market sectors, among other initiatives. In summary, the focus has been to take a strong foundation of manufacturing and services and expand from this foundation outward, seeking new markets. Some of these markets can harness existing infrastructure and skills, and some require new development.

Other potential energy transition opportunities in Wyoming lie in the area of carbon sequestration and methane capture from coal mines. Wyoming enables deep-well carbon dioxide injection, and some coal mines in Wyoming are close to infrastructure to transport and use natural gas, thus supporting methane capture prospects.[31]

B. Routt County, Colorado

As with Wyoming and New Mexico, much of Colorado's economy depends on fossil fuel development. The transition away from fossil fuels is posing challenges particularly for coal communities, which are experiencing some of the most bankruptcies and job losses. Routt County has one coal-fired power plant, Hayden Station, which creates 64 jobs within the community, and the Twenty Mile Coal Mine, which is associated with 266 jobs—representing approximately two percent of the direct jobs in the county.[32] Although the percentage of coal jobs within the community is low, the tax consequences of closing coal mines and power plants are substantial. For example, fifty percent of a recent $30 million bond for the Hayden School District is paid annually by the power plant.[33]

Beth Molton, a County Commissioner, describes Routt County's energy transition as an economic one—not an energy one. The county is unlikely to replace energy jobs, and the important tax base from coal, with other energy industries. Coal workers in the area can make roughly $75,000 annually out of high school, as compared to approximately $15 hourly installing solar panels. Rather than focusing on replacing old energy jobs with new ones, the county is working to diversify its economy and attract industries.

Counties such as Routt County that are losing a large amount of their tax base due to mine and power plant closures are receiving more support from the state than those in Wyoming.

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[31] ENV'T PROTECTION AGENCY, CMM RECOVERY AND USE: OPPORTUNITIES AT WESTERN U.S. MINES at 2, https://www.epa.gov/sites/default/files/2019-08/documents/cmop-western-mines-flyer.pdf?VersionId=OFz5qKretARPZbA8LuF4JzCg3Wg4XxVT; Wyoming Dept. of Env'tQuality, Underground Injection Control, https://deq.wyoming.gov/water-quality/groundwater/uic/ (showing that Wyoming has "primacy" (regulatory authority) to approve federally-regulated Class VI (carbon) injection wells).

[32] Direct jobs are "jobs that are involved in producing and delivering energy products to a final consumer." ENERGY POLICY INSTITUTE, CENTER FOR ADVANCED ENERGY STUDIES, EMPLOYMENT ESTIMATES IN THE ENERGY SECTOR: CONCEPTS, METHODS, AND RESULTS 7 (2013), https://www.ourenergypolicy.org/wp-content/uploads/2015/06/employment-estimates-in-the-energy-sector-concepts-methods-and-results.pdf.

[33] Allen Best, *As Colorado Towns Come to Grips with a Coal-Free Future, the State Looks for Ways to Help*, ENERGY NEWS NETWORK (Aug. 6, 2020), https://energynews.us/2020/08/06/as-colorado-towns-come-to-grips-with-a-coal-free-future-the-state-looks-for-ways-to-help/ (noting that the coal fired power plant pays 57% of property taxes in the Hayden School District).

Labor unions spearheaded a state bill, HB 19-1314, to create an Office of Just Energy Transition and an advisory committee comprised of representatives from labor, community groups, and state agencies. The office currently only has one staff member, however. Despite limited resources, these state-level groups have produced useful recommendations for financing the transition, ranging from grants and fiscal policy reforms to specific tools such as wage differential payments for workers. The overall state-level focus is on creating a more diverse economy and a broader tax base.

II. Reimagining Communities

Other areas experiencing energy transitions are harnessing existing strengths but are also engaging in an extensive reimagining of their economic identity. Examples from the workshop included Montour County, Pennsylvania, and Sweetwater, Texas.

A. Montour County, Pennsylvania

Communities in Pennsylvania are experiencing the energy transition in varied ways in part due to strong local control over the siting of new energy installations.[34] The Pennsylvania Solar Future Plan sets a target of generating 10 percent of Pennsylvania electricity from in-state solar energy by 2030, and the past several years have seen rapid growth of solar development in the state.[35] Solar development in Pennsylvania is effective even without subsidies to solar developers due to the state's status as a net exporter of electricity, an abundance of transmission lines, and the availability of open land and marginal farmland. A large number of utility-scale solar projects have been proposed in Pennsylvania, and these could present economic development potential regionally; installation labor and construction equipment represent approximately 19 percent of project cost.

Despite the opportunities posed by utility-scale solar in Pennsylvania, there are obstacles to this development—many of which emanate from the "hyper local" nature of solar regulation in the state. Local governments in Pennsylvania control the siting of solar projects, and a significant minority of these governments do not have zoning regulations to dictate the location or form of these projects.[36] The state allows joint zoning, but only approximately a dozen municipalities have worked together in this way. Even when local governments do have zoning regulations in place, solar implementation can be challenging because the topography of the region can limit siting options. Moreover, local residents' concerns about prime agricultural land

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[34] The Pennsylvania has delegated some of its power to regulate land use to municipalities under the Pennsylvania Municipalities Planning Code (PMPC). 53 PA. CONS. STAT. § 10105 (2021) ("It is the intent, purpose and scope of this act . . . to guide uses of land and structures, . . . [and] to promote the conservation of energy through the use of planning practices and to promote the effective utilization of renewable energy sources. . . ."). Counties and municipalities in turn may establish a Planning Commission who create a Comprehensive Plan that addresses future development within the respective jurisdiction. 53 PA. CONS. STAT. § 10202 (2021). This Plan can include statements about the plan's consequences of the local environment and ultimate energy conservation goals. 53 PA. CONS. STAT. § 10301(a)(4.1) (2021).

[35] DAVID ALTHOFF JR. & ROBERT ALTENBURG, PA. DEP'T OF ENV'T PROT., PENNSYLVANIA'S SOLAR FUTURE PLAN 9 (2018), http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=1413595&DocName=PENNSYLVANIA%26%2339%3bS%20SOLAR%20FUTURE%20PLAN.PDF%20%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e.

[36] Presentation by Robert Young, Pennsylvania Dep't of Env't Prot., May 25, 2021. Only one in ten municipalities in Pennsylvania has a solar specific ordinance.

preservation can generate pushback.[37] A variety of trust issues have arisen from proposed solar projects in the state, emanating largely from the procedures followed in solar approval processes and individuals' experiences and perceptions of different types of industries.[38] Local concerns about proposed solar development are highlighted by a proposed solar project in Montour County, Pennsylvania.

Montour County is a small, predominantly agricultural area of Pennsylvania facing proposals to develop more than 5,000 acres of land as utility-scale solar photovoltaic (PV) generation plants.[39] Several areas of Pennsylvania are currently undergoing similar transitions, driven largely by the state renewable portfolio standard that only covers in-state solar. For Montour County, the construction of this amount of solar acreage would transform the community into an energy producing community while also allowing some farming to continue on the solar land—albeit different types of farming than are currently present within the community. This planned transformation contrasts somewhat with places like Sheridan, Wyoming, which will continue to be manufacturing towns while also expanding into businesses such as software.

The change within Montour County is a departure from the county's current, land use, agriculture.[40] The county hosts one fossil fuel-fired power plant, but the owner of the plant currently leases out much of the land surrounding the plant for farming and allows recreation, such as hunting, on the property. The solar generation proposed in the county would cover some of these power plant lands, causing some existing leases to farmers to be canceled. For the remaining proposed solar acreage, solar developers would lease land from farmers whose businesses are currently struggling.

The proposed transition to solar in Montour County will also require farmers who lease their lands to strike out into new, unfamiliar markets and adapt to changing agricultural market conditions.[41] For example, raising turkeys and sheep are practices that are compatible with utility-scale solar PV, and there are currently strong markets in the Mid-Atlantic and Northeast for these agricultural resources.[42] But neither sheep nor turkeys have been common agricultural

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[37] *Id.*

[38] *See also* Hilary S. Boudet, Public Perceptions of and Reponses to New Energy Technologies, 4 NATURE ENERGY 446 (2019).

[39] Two projects are currently under development in Montour County: the East Chili Solar PV Park, a 20MW solar PV project, and the Montour Solar One Project, a 100MW solar PV project. *East Chili Solar PV Park, US*, POWER TECH. (Feb. 9, 2022), https://www.power-technology.com/marketdata/east-chili-solar-pv-park-us/; *Montour Solar One Project, US*, POWER TECH. (Dec. 24, 2021), https://www.power-technology.com/marketdata/montour-solar-one-project-us/

[40] Approximately 41% of Montour county's total acreage is used for agriculture and 15% is developed land. *Countywide Action Plan Snapshot*, PA. DEP'T OF ENV'T PROT. (2020), https://files.dep.state.pa.us/Water/ChesapeakeBayOffice/WIPIII/2022/Montour/Montour_Snapshot_Dec2021.pdf

[41] PEGGY HALL ET AL., NAT'L AGRIC. L. CTR., FARMLAND OWNER'S GUIDE TO SOLAR LEASING 13 (Aug. 2019), https://nationalaglawcenter.org/wp-content/uploads/assets/articles/hall_solar_Leasing.pdf ("Removing parcels of land from agricultural production will require a reconsideration of the components of the operation. With fewer acres, operating costs could increase on remaining parcels. The loss of grazing, forage, or manure application land could require a decrease in livestock numbers.")

[42] This practice, known as "solar grazing," creates a symbiotic relationship between solar developers and farmers. Livestock eat the vegetation under the panels and use the panels for shade while the solar developer has their landscaping costs offset. *See What Is Solar Grazing?*, AM. SOLAR GRAZING ASS'N, https://solargrazing.org/what-is-solar-grazing/ (last visited Feb. 25, 2022); *Sheep Grazing to Maintain Solar Energy Sites in Pennsylvania*, PENN

resources in Montour County in the past, thus requiring a shift in the agricultural landscape. In other Pennsylvania communities that already host solar, some farmers who have leased their land for solar have begun to successfully transition to raising sheep and turkey, which has improved the economic viability of their business.[43]

Despite the opportunities presented by solar in the form of lease profits and agrivoltaics (farming on the land where solar panels are located), Greg Molter, Montour County's planning director, noted the unprecedented conflict that the proposed solar project created within the county. The opposition from some segments of the community has been strong, with accusations that planners are taking pay-outs from solar companies. Many farmers are supportive of solar leases, as they are providing a lifeline for farms that would otherwise go out of business.[44] However, a vocal group of residents staunchly oppose the proposed solar development. They assert that they will lose hunting land and prime farmland and that property values will decline.[45] Those opposed to the project have also voiced concerns that there will be runoff from solar sites and are concerned about water contamination.

The mistrust from this segment runs deep, perhaps in part due to the magnitude of the transformation. County planners have attempted to address community concerns by providing examples of other successful solar energy developments in Pennsylvania agricultural communities and conducting listening sessions within each municipality with no industry leaders present. At the time of the workshop, the county was preparing to finalize a draft ordinance that will address residents' concerns, after multiple revisions.[46]

B. Sweetwater, Texas

The community of Sweetwater, Texas has already experienced the type of dramatic transition that is underway in Montour County. Just as Pennsylvania policy has sparked proposals for numerous solar farms within Pennsylvania communities, the State of Texas initiated an extensive build-out of wind energy in the state through legislative effort. Specifically, the Texas Legislature directed state agencies to identify the areas of Texas that were most amenable to wind energy—those that had open space and strong wind resources.[47] These areas were called Competitive Renewable Energy Zones," or CREZ areas. The Texas Legislature also required state agencies to determine where to locate transmission lines to connect new wind energy generation to high-population areas that consume large quantities of electricity.[48] And finally, the legislature also required state agencies to select companies that would build

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STATE EXTENSION (Aug. 19, 2020), https://extension.psu.edu/sheep-grazing-to-maintain-solar-energy-sites-in-pennsylvania.

[43] *See* PENN STATE EXTENSION, *supra* note 40.

[44] *See* Joe Sylvester, *Residents, Some Wary, Speak Out About Montour Solar Farm*, THE DAILY ITEM (Jul. 23, 2021), https://www.dailyitem.com/news/residents-some-wary-speak-out-about-montour-solar-farm/article_0bc77968-eb54-11eb-9720-8f3890dca78f.html; Sean Coffey, *Montour County Residents Push Back Against Solar Array*, PA HOMEPAGE (Oct. 16, 2020), https://www.pahomepage.com/news/montour-county-residents-push-back-against-solar-array/.

[45] *Id.*

[46] During his presentation, Robert Young noted several items to consider when drafting a solar ordinance including impervious coverage, storm water run-off, setbacks, height restrictions, impacts on agricultural soils, minimum lot sizes, decommissioning, viewshed pacts, vegetative screening, vegetative cover/pollinators, easements, and glare and noise.

[47] Texas S.B. No. 20 (2005), https://capitol.texas.gov/tlodocs/791/billtext/html/SB00020F.HTM.

[48] *Id.*

transmission lines from the high-wind areas to population centers. Wind energy developers subsequently flocked to the CREZ areas—primarily in West Texas—and built many wind farms. Texas now has more wind generation capacity than any other state.

Sweetwater, home to approximately 11,000 people, is located within a CREZ zone in Texas. Its economy is comprised primarily of manufacturing, retail trade, health care/social services, agriculture, and transportation/logistics—all in nearly equal shares—with renewable energy also playing a significant role.[49] As a result of the Texas CREZ directive and growing demand for renewable energy generally, the county now has 1,438 wind turbines and a large solar farm with 709,000 panels.[50] This significant build-out of renewable energy infrastructure has caused major changes within the county, modifying the physical landscape and transforming the economy. The wind industry has made Sweetwater a center of logistics and transportation of wind infrastructure, and it generated a temporary boom in construction jobs. Manufacturing firms had to raise their pay scales to compete with the pay offered by the renewable energy industry. According to Ken Becker, Executive Director, SEED Municipal Development District, over approximately twenty years, the taxable value (sales, property, and other taxable resources) within the county was $630 million. Ten years later, because of wind development, this rose to $2.5 billion, and the value reached $3.2 billion by 2018. The economic benefits allowed the county to use the sales tax revenues to form an economic development organization.

Although Sweetwater has experienced an economic boom, its population has declined. Industry managers can live in other towns and commute in, leading Sweetwater leadership to realize that in addition to attracting industry, the town needs to enhance its "curb appeal." The town has worked to offer more amenities to workers, such as improving housing and retail options, to help attract workers.

As communities experience declines in energy industries such as coal mining and booms in renewable energy development, residents and leaders alike experience and shape changing culture, economics, landscapes, and job prospects. Local government leaders work with different levels of state support for this challenge—sometimes almost no support—and must address myriad factors that arise in the transition, from the need to supply high-quality jobs and bolster a waning tax base to the importance of addressing all aspects of local economic growth, including supporting quality of life for a growing local workforce.

III. Navigating State-Local Government Relationships in the Energy Transition

A third major theme that emerged from the workshop—which we foreshadowed above in our discussion of different economic development approaches—is variation in state and local government relationships as the energy transition unfolds. In places such as Colorado, Pennsylvania, and Texas, state energy policies in part have driven major new energy development with which local governments have contended. This growth has fueled local economies but has also raised challenges. In Pennsylvania, with more than 2,000 different municipalities and no centralized siting regime for renewable energy generation, local officials have in some cases faced stiff opposition to solar farms from some residents while attempting to

[49] Sweetwater, Texas, Key Industries, https://www.sweetwatertexas.net/strategic-advantages/key-industries/.

[50] *Renewable Energy*, SWEETWATER ECON. DEV., https://www.sweetwatertexas.net/strategic-advantages/key-industries/energy/windpower/ (last visited Feb. 25, 2022).

write new ordinances to allow solar development and control its impacts.[51] In Sweetwater, Texas, local governments benefited from the economic boom fueled by state policy and changing demand for renewable energy, but they also had to race to keep up with changes, such as attracting the workers needed to support renewables and other manufacturing growth.

In other cases, local governments are essentially "going it alone" in the energy transition, embarking on efforts more ambitious than those at the state level, or conflicting with state policy. We provide three case studies below. First, in Philadelphia, where the state has a renewable portfolio standard but no specific policy for an energy transition, the city has initiated a large effort to expand clean energy resources and associated jobs. This is largely in accordance with state policies supporting renewables but goes much farther than Pennsylvania goals and mandates. Similarly, in Multnomah County, Oregon, the County has an aggressive clean energy policy that parallels ambitious state policy mandates but is arguably more aggressive, as explored below. And finally, in Lawrence County, Kansas, voters have supported renewable energy policies and a ban on natural gas in new construction, but the state has preempted some of the local government's policy approaches.

A. Philadelphia, Pennsylvania

With Philadelphia having carried the distinction of being the poorest big city in America for over two decades, there are a multitude of challenges adding complexity to the city's energy transition. At least once a year, over 50% of African American households at any income level and over 30% of all renters face energy insecurity and must forego necessities to maintain their power.[52] Whether this requires limiting food or medicine purchases to pay for utilities, shutting off appliances to save power, or setting the temperatures to unhealthy levels, many residents of Philadelphia face these difficult trade-offs due to their high energy burdens.

While working to address these energy burdens, the Office of Sustainability in Philadelphia also has ambitious energy transition goals, such as 100% renewable energy by 2030 and city-wide carbon neutrality by 2050.[53] However, there are substantial hurdles to these goals. The Commonwealth of Pennsylvania does not allow community solar, which would allow common subscribers to solar projects to enjoy the benefits of solar energy while potentially paying lower rates for electricity.[54] There are also strict rules surrounding virtual meter aggregation, so solar cannot be installed on top of tenant buildings for the benefit of tenants, as opposed to landlords.[55]

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[51] *See, e.g.*, *As Solar Scales Up, Development Controversies Follow*, PLANETIZEN (Nov. 3, 2021), https://www.planetizen.com/news/2021/11/115169-solar-scales-development-controversies-follow (noting the high amount of opposition that solar developers receive from local communities); Daniel Hamburg, *Dozens of People Voice Opposition to Proposed Lebanon County Solar Farm*, ABC NEWS (Jan. 26, 2022), https://www.abc27.com/news/local/lebanon/dozens-of-people-voice-opposition-to-proposed-lebanon-county-solar-farm/.

[52] *Residential Energy Consumption Survey: Implications for Philadelphia*, PHILADELPHIA ENERGY AUTHORITY (Mar. 12, 2018), https://philaenergy.org/residential-energy-consumption-survey-implications-for-philadelphia/.

[53] Resolution No. 19072800, City Council of Philadelphia, Pa. (Sept. 29, 2019).

[54] Pa. S.B. No. 472 (2021) (introduced), https://www.legis.state.pa.us/CFDOCS/Legis/PN/Public/btCheck.cfm?txtType=PDF&sessYr=2021&sessInd=0&billBody=S&billTyp=B&billNbr=0472&pn=0491 (showing proposed legislation that would enable community solar projects in Pennsylvania).

[55] Pennsylvania Act 35 (2007) (only allowing multiple-metered connections within two miles of the primary meter),

Despite these challenges, Philadelphia is looking to utilize energy as a tool for significant economic and social advancements, with hopes of stimulating economic development, creating jobs, alleviating poverty, and improving public health. One example of this progress is the Philadelphia Energy Campaign, which is a ten-year initiative to invest one billion dollars in energy efficiency and clean energy projects to create 10,000 jobs by 2025.[56] Another program designed to provide more renewable energy opportunities to more segments of the population is Solarize Philly, which is the largest program of its kind in the nation. The program aims to provide rooftop solar energy to many households in the city and to employ individuals through a workforce development program.[57] Solarize Philly will focus this program on communities of color and in areas where there has been systematically unequal access to a clean energy economy for better equity and social stimulation. With respect to workforce development, Philadelphia's Solar Energy Career and Technical Education Program (CTE) is the first of its kind in the nation and provides education and internship opportunities to people in Philadelphia for a larger clean energy workforce.[58]

Finally, solar equity is a primary focus for the city, as CTE has provided an opt-in offer for utility-scale customers as a small extra charge to support equitable access to rooftop solar and solar jobs. This will create long-term, sustainable funding sources for programs like Solarize Philly.

B. Multnomah County, Oregon

Multnomah County, like Philadelphia, has been a local leader in terms of proposing and enacting goals and programs without much assistance from its home state. While Oregon has its own goals and requirements for energy transitions and sustainable practices, Multnomah County is taking an aggressive approach to manage the transition. By 2035, the County seeks to utilize renewable energy for 100% of community-wide electricity needs, and by 2050, it aims for renewable energy to cover 100% of community-wide *energy* needs.[59] The urban county is currently served by two investor-owned utilities and one gas utility, with hopes to catalyze investment in distributed energy resources, energy efficiency, storage, and resiliency, among other related goals.

Unlike other counties dealing with energy transitions, Multnomah County does not have fossil fuel or thermal generation located within the county itself. When considering the implications of a transitioning community, internal job loss is less of a restriction for the county's transition goals.

Environmental justice is one of the county's highest priorities as it moves forward with its sustainable actions and plans. Its Office of Sustainability requires that every individual has equal access to the opportunities provided in the transition, as well as the efforts associated with

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[56] *See The Philadelphia Energy Campaign*, PHILADELPHIA ENERGY AUTH., https://philaenergy.org/programs-initiatives/the-philadelphia-energy-campaign/ (last visited Feb. 28, 2022).

[57] SOLARIZE PHILLY, https://solarizephilly.org/ (last visited Feb. 28, 2022).

[58] *See Solar Energy*, THE SCH. DIST. OF PHILADELPHIA, https://www.philasd.org/cte/our-cte-programs/natural-sciences/solar-energy/ (last visited Feb. 28, 2022).

[59] Resolution No. 2017-046, MULTNOMAH CNTY., OR. (June 1, 2017), https://multco-web7-psh-files-usw2.s3-us-west-2.amazonaws.com/s3fs-public/2017-046.pdf; 100% Renewable by 2050, MULTNOMAH CNTY., OR., https://www.multco.us/sustainability/100-renewable-2050 (last visited Feb. 28, 2022).

them.[60] The office is prioritizing recruitment of women and BIPOC communities in the clean energy workforce as it continues to expand and develop. The county has a strong network of environmental justice organizations that have supported the Portland Energy Fund for climate resiliency and related investments. Other connections that the county seeks to strengthen are with nearby tribes and native communities, communities of color, and low-income communities.

While potential paths towards a stronger energy transition include community choice aggregation or municipalization regarding renewable energy, the county is leaning towards using the Community Green Tariff to pursue its goals.[61] This serves as a likely tool for the community given that the Office of Sustainability is already familiar with the program. As of May 2021, three bills have been enacted that enable and specify the contours of the Community Green Tariff. Multnomah County is part of the Oregon Clean Energy Opportunity Coalition, which is also looking to support a 100% clean energy bill with the Community Green Tariff.[62]

C. City of Lawrence and Douglas County, Kansas

Despite the relative inaction of Kansas as a state to pursue clean energy transitions, the City of Lawrence and Douglas County have established goals and bills to promote sustainability in their communities. In March of 2020, the city adopted an ordinance that established a goal of 100% clean/renewable energy by 2035.[63] After a power purchase agreement in November of the same year, 98% of electricity for municipal operations was supplied through clean energy.

The Kansas government, with a conservative majority in office, took measures to inhibit the City of Lawrence and Douglas County in its energy transition. In January of 2021, the state introduced Senate Bill 24, tilted the Energy Choice Bill.[64] This bill, promulgated in Spring 2021, prohibits cities from setting goals and making plans to transition away from natural gas utilities and resources. The bill aims to ensure that natural gas will have a future in Kansas while simultaneously limiting the possibilities of lower carbon energy displacing natural gas.

Despite this type of state action, the City of Lawrence and Douglas County continue to work towards energy transitions, directing city staff to incorporate the five principles of the Green New Deal into operations. Some examples of this incorporation include investing in infrastructure, reaching net zero greenhouse gas emissions, and providing a fair and just transition for the community. In April of 2021, the city also announced that the electric utility would decommission the coal plant by 2023, with the opportunity to utilize the site for renewable energy generation.

D. Denton, Texas

Denton, Texas, like Lawrence in Kansas, represents the challenges and opportunities faced by communities with energy transition policies that do not fully align with state policies.

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[60] *See About the Office of Sustainability*, MULTNOMAH CNTY., OR., https://www.multco.us/sustainability/about-office-sustainability (last visited Feb. 28, 2022).

[61] *Advisory Committee on Sustainability and Innovation (ACSI) Meeting Minutes: April 4, 2020*, MULTNOMAH COUNTY, OR. OFF. OF SUSTAINABILITY (Apr. 8, 2020), https://multco-web7-psh-files-usw2.s3-us-west-2.amazonaws.com/s3fs-public/ACSI%20Meeting%20Minutes%2004-08-20.pdf (noting that one of the action items from the meeting is to "identify opportunities for ACSI members to engage in community green tariff process").

[62] OR. CLEAN ENERGY OPPORTUNITY CAMPAIGN, https://cleanenergyoregon.org/ (last visited Feb. 28, 2022).

[63] Ordinance No. 9744, CITY OF LAWRENCE, KAN. (Mar. 3, 2020).

[64] Kan. Senate Bill No. 24 (enrolled), http://kslegislature.org/li/b2021_22/measures/documents/sb24_enrolled.pdf.

Texas is the largest producer of wind, and solar is growing quickly within the state, but state policies also strongly favor oil and gas. The City of Denton, in contrast, voted to ban hydraulic fracturing—a move that prompted the Texas Legislature to preempt most local control over oil and gas development.

Despite differences between Denton and state policies, the Denton example highlights local governments' ability to selectively harness the advantages of state policies that support an energy transition to lower-carbon resources. In 2018, Denton's City Council promulgated a goal to obtain 100 percent of Denton's energy from renewable energy by 2020, and the city has contracted to purchase renewable electricity to cover this amount. Complicating this plan is a natural gas plant built by the city, which was supposed to make money for the city by selling electricity during times of peak demand. The plant was on track to do this until the crisis caused by Winter Storm Uri in February 2021, when many power plants—including Denton's plant—could not produce power due to frozen equipment or a lack of natural gas supply to the plant.

Philadelphia, Pennsylvania and Multnomah County, Oregon, exemplify local governments pushing the energy transition forward in a manner that largely parallels state goals, whereas Lawrence, Kansas and Denton, Texas show efforts by communities essentially "going it alone" through transition efforts.

Conclusion

The phrase "energy transition" is a deceptively simple term for an exceedingly complex phenomenon. As governments at all levels work to address a range of demands, from affordable and reliable energy to job high-quality employment and the mitigation of climate change, the energy transition will play out quite differently in different places. Our Summer 2021 workshop with leaders from local and state government, think tanks, and nonprofit organizations revealed several themes that define this varied transition. First, many communities will work to build from their existing infrastructure, talent, and natural resources as they transition away from a fossil fuel-centric economy. Others will rely more on a wholescale restructuring of their culture and economy—sometimes not due to a concerted choice but because of an economic boom in renewable energy. Many communities are likely to move forward with some combination of reinvention and reworking of existing resources.

All places experiencing the transition will have to navigate the complex interplay of local, state, and federal policies. In the United States, most of the drivers of the energy transition have been state and local, although recent federal initiatives—particularly the Infrastructure Investment and Jobs Act—also work to hasten this transition by, for example, supporting transmission infrastructure for renewable energy generation and energy efficiency initiatives. Furthermore, the U.S. policies driving the transition are sometimes in harmony, with local governments augmenting state initiatives to increase low-carbon energy. Yet energy policies are increasingly in conflict as state governments preempt local energy transition initiatives. In still other cases there is no direct conflict between state and local policies, but communities struggling to address rapidly changing employment, such as losses of coal mine jobs, have received little state or federal support.

Appendix A. Workshop Speakers and Discussants and Titles as of June2021

Speakers

Jonathan Andrews, Chair, Real Estate Group, McNees

Ken Becker, Executive Director, SEED Municipal Development District, Sweetwater, Texas

David Breecker, Microgrid Systems Laboratory, New Mexico

Scott Coburn, Education Director and Counsel, Pennsylvania State Association of Township Supervisors

M. Elizabeth (Beth) Melton, County Commissioner, Routt County, CO

Paul Meltzer, City of Denton, Texas, City Council Member

Greg Molter, Planning Director, Montour County, PA

Jasmin Moore, Sustainability Director, City of Lawrence and Douglas County, Kansas

Emily Schapira, President & CEO, Philadelphia Energy Authority

Jay Stender, Principal, The WY Ranch (energy industry hub), Wyoming

Silvia Tanner, Senior Sustainability Analyst, Office of Sustainability, Multnomah County

Robert Young, Southwestern Regional Office, Pennsylvania Department of Environmental Protection.

Discussants

Mohamed Rali Badissy, Assistant Professor of Law at Penn State Dickinson Law

Dr. Andrew Curley, Assistant Professor in the School of Geography, Development & Environment (SGDE) at the University of Arizona

Ann M. Eisenberg, Associate Professor of Law at the University of South Carolina School of Law

Dr. Julia Haggerty, Associate Professor at the Department of Earth Sciences, Montana State

Dr. Tyler Harlan, Assistant Professor at Loyola Marymount University, Department of Urban and Environmental Studies

Dr. Elise Harrington, Assistant Professor at the Humphrey School of Public Affairs at the University of Minnesota in the Science, Technology, and Environmental Policy

Dr. Cris Moore, Resident Professor, the Santa Fe Institute

Dr. Dustin Mulvaney, Professor in the Environmental Studies Department at San José State University (SJSU) and a Fellow with the Payne Institute for Public Policy at the Colorado School of Mines

Thomas B. Murphy, Director of the Penn State Marcellus Center for Outreach and Research (MCOR)

Uma Outka, Professor and Associate Dean for Faculty at the University of Kansas School of Law

Gabe Pacyniak, Associate Professor at the University of New Mexico School of Law

Saumya Vaishnava, PhD student in the Department of Geography at Pennsylvania State University

Adam Walters, William Penn Fellow with the Department of Community and Economic Development