

Coal communities and the U.S. energy transition: A policy corridors assessment

Kelli F. Roemer^{*}, Julia H. Haggerty

Earth Sciences Department, Montana State University, Bozeman, MT, 59717-3480, USA

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ABSTRACT

Local economies with immediate ties to coal-fired power generation face acute challenges from energy system transitions, particularly in the United States where energy policy is heavily devolved and uncoordinated. This study employs a community resilience and transition theory framework to examine how federal and state policies enable or constrain transition planning in rural, coal communities in the U.S. West. Our mixed-methods approach incorporates policy and document analysis with in-depth interviews with policy experts and practitioners. We find that the absence of a national energy transition policy exacerbates uncertainty for coal communities, and as a consequence, two distinct and diverging policy corridors emerge at the state level. According to expert interviews, existing transition assistance policies do not align with the needs and capacity of transitioning coal communities. Together, these findings highlight the need for policies that coordinate the energy transition and provide opportunities and resources that support communities navigating the social and economic impacts of transition.

1. Introduction

The United States is undergoing a major energy system transition characterized by widespread retirement of its aging coal-fired power plants, reduced use of operating coal plants, and decline in thermal coal exports. The coal transition is driven by market forces such as increased competition from natural gas and renewable sources, as well as an overall stagnant demand for electricity (U.S. EIA, 2019). In early 2020, the effects of the COVID-19 global pandemic compounded declines in coal electricity generation and production and led to speculation of accelerated closure timelines of U.S. coal facilities (U.S. EIA, 2020). For coal-dependent communities, states, and regions, the energy transition brings a set of social and economic, and environmental impacts that vary greatly by geography (Carley et al., 2018a, 2018b). In the American West, remote and rural communities are particularly vulnerable to the social and economic impacts of the coal transition (Haggerty et al., 2018).

Federal and state policies shape the direction and pace of transitions and have long-term implications for community resilience (Markantoni et al., 2018; Martens and Rotmans, 2005; Ray, 2000; Wilson, 2013). To meet global climate objectives, several developed economies have implemented coal phase-out initiatives (Sartor, 2018). In contrast, the

United States does not have a national set of policies designed to facilitate the energy transition (Graff et al., 2018). Rather, policymaking in the U.S. is highly decentralized with individual states introducing their own sets of policies on energy production, consumption, as well as mitigating the socio-economic implications of transition. Thus, the current policy landscape addressing the community-level impacts of the coal transition is complex and disjointed, presenting a need for a critical assessment of existing policies and how they align (or misalign) with the needs of impacted communities.

This paper responds to the call for increased understanding of interactions between macro-scalar policy and community experiences with transitions (Markantoni et al., 2018; Sisto et al., 2018; Wilson, 2013) by reviewing federal and state policies that address the socio-economic impacts of the coal transition in rural communities in the United States. Historically, studies of U.S. coal resources have been studied regionally. While there are ongoing transitions in Appalachia and Illinois Basin, this study focuses on the dynamics of the coal transition in the U.S. West, which are strongly influenced by and specific to the physical and political geographies of the region's energy system (see Fig. 1) (Haggerty et al., 2018). This paper uses Geoff Wilson's concept of policy corridors to examine how exogenous forces, such as policy, influence options for isolated communities as they navigate the

^{*} Corresponding author.

E-mail address: kelliroemer@montana.edu (K.F. Roemer).

multifaceted coal transition provides an opportunity to increase insight and understanding of how macro-scalar policies shape the direction and pace of complex community transitions in resource regions (Wilson, 2012, 2013). Through a review of national and state policies, supported by in-depth interviews with policy experts and practitioners, this research characterizes and compares the emerging policy corridors between U.S. states and examines how they may enable or constrain resilient community pathways. This study focuses on three sets of policies: U.S. federal energy policy, state-level transition policies, and federal transition assistance programs, and their implications for the policy corridors emerging in states in the U.S. West.

This paper begins by situating coal community transitions within the community resilience and transition theoretical framework, and also the broader geographic scholarship examining socio-economic transitions in resource peripheries. The next section describes our study region, methods, and analytical approach. Then we describe the findings from the multi-scalar policy review and expert interviews. The conclusion discusses recommendations for policy and future research.

2. Literature review: transitions, community resilience, and policy corridors

Between 2010 and 2019, U.S. power companies have retired or announced the retirement of more than 546 coal-fired power units, totaling about 102 GW of generating capacity, with another 17 GW of capacity planned for retirement by 2025 (U.S. EIA, 2019). Socio-economic vulnerability to declining coal power and mining sectors varies across the United States but in the American West vulnerability is associated with remote, isolated geographies (Haggerty et al., 2018). The dynamics of the West's coal transitions are strongly influenced by the physical and political geographies of the region's energy system. The region's energy infrastructure is typical of the coal-by-wire model, where large mine-mouth facilities located in remote interior regions export electricity long distances over high-voltage transmission lines to meet the needs of urban centers in other states (Ramage and Everett, 2012). For the last 50 years, the West's coal resource and

electricity-producing regions have operated as resource peripheries. Resource peripheries are vulnerable to the changing prices and demands of urban cores and gain competitive advantages through large scale and low-cost production (Freudenburg, 1992; Hayter and Barnes, 1990; Wallerstein, 2004).

The West's rural, isolated communities are significantly more vulnerable to revenue and employment loss following a coal plant or mine closure than their metropolitan counterparts. Currently, the planning processes for local impacts of the coal transition vary substantially (Haggerty et al., 2018). For many years, coal production and electricity generation have generated taxes, royalties, and fees to states and communities where they are located, providing stable and substantial revenue (Godby et al., 2015). In the West's coal producing regions, state and local government funding has evolved to depend heavily on the coal industry (Haggerty, 2019). As a result, energy transitions at the national level encompass a social, economic, and fiscal transition that put local livelihoods, identities, and public services at risk.

Resource-dependent communities are shaped by historical and interconnected global-local dynamics that are constantly evolving (Halseth, 2017). Scholars employ a range of concepts and theoretical frameworks to investigate the multifaceted processes shaping transitions in resource regions, including historical approaches (Ryser et al., 2019), political economy perspectives (Connelly and Nel, 2017), and evolutionary economic geography (Argent, 2017). Specific to energy system transitions, scholars tend to focus most heavily on the technical, economic, and political factors shaping the adoption of new energy technologies at macro-scales (Markard et al., 2012; Smil, 2010; Stokes and Breetz, 2018). Recent energy transition research engages in geographically sensitive questions in resource peripheries (Murphy and Smith, 2013), spatial assessments of vulnerability to impacts of 'low-carbon' energy transitions (Carley et al., 2018a; Harrahill and Douglas, 2019; Snyder, 2018), and community-level effects of energy transitions (Carley et al., 2018b; Graff et al., 2018; Haggerty et al., 2018). Building on these threads of scholarship, this study focuses on how policy and other external forces influence the options for isolated communities as they navigate the transition initiated by coal-plant and mine closures. This

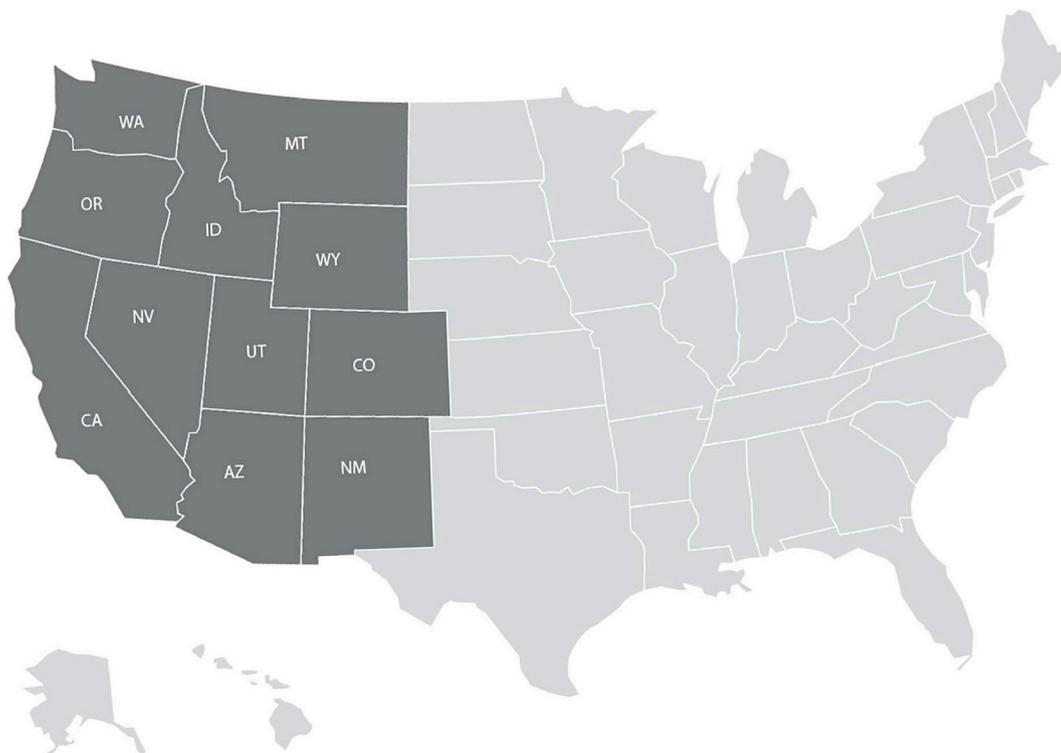


Fig. 1. Map of the U.S. West.

study applies concepts from Wilson's (2012) community resilience and transition theory framework to understand the circumstances shaping community transitions.

The concept of community resilience resonates in an age of widespread economic and environmental uncertainty and political-economic contexts characterized by devolved governance. A community's resilience is often understood as the capacity of its social system to mobilize its resources and work together in response to a shock (Berkes and Ross, 2013). Key features of community resilience include strong social capital with cross-scale linkages between stakeholders and organizations (Besser and Miller, 2013; Harrison et al., 2016), the ability of the community to learn, self-organize, and problem solve (Berkes and Ross, 2013), inclusive and collective governance systems (Kulig et al., 2013; Norris et al., 2008), and strong institutions that are willing to partner and experiment (Anderies et al., 2004). These factors and processes of agency and self-organizing shape a community's adaptive capacity – the capacity of actors in a system to influence community resilience (Berkes and Ross, 2013; Folke et al., 2005). To understand how community resilience and vulnerability change over time, this research links community resilience with complementary concepts from transition theory.

Transition theory examines the patterns and mechanisms driving large-scale, long-term, and non-linear social change. Transition theory seeks to “unravel socioeconomic, political, cultural, and environmental complexities of societal transitions from one state of organizations to another” (Wilson, 2012: 53), and has been applied in diverse contexts such as global sustainable development (Loorbach, 2007), policy change (Loorbach and Rotmans, 2010), socio-technical transitions of energy systems (Geels, 2006; Geels and Schot, 2007; Martens and Rotmans, 2005), and socio-environmental transitions in land use and agriculture (Wilson, 2012). Empirical research in transition studies often focuses on the technical aspects of changes in energy, agriculture, or sustainable development (Geels and Schot, 2007; Martens and Rotmans, 2005; Wilson, 2010). However, scholarship focusing on the social aspects of transitions remains largely theoretical (Wilson, 2012, 2013, 2015).

As a means to embrace the complexities of community transitions and to untangle interwoven factors and processes shaping future trajectories, this study applies concepts from transition theory to investigate coal community transitions including community pathways, transition corridors, transitional ruptures, and policy corridors. The community pathways concept focuses on the cumulative actions at individual and stakeholder group levels and how they change over time. Transition corridors assume that community pathways of change are channeled into specific corridors defined by decision-making boundaries beyond which decisions are increasingly unlikely. This concept describes the exogenous factors such as macro-level socio-economic, political, and environmental processes, upon which communities have little influence but severely constrain decision-making and action at the community level (Wilson, 2012). While community pathways are usually characterized by slow and gradual change over time, the concept of transitional ruptures, usually associated with sudden changes at the macro-level such as a sudden shift in markets or policy change, suggests that community resilience can change rapidly from one moment to another (Wilson, 2014). According to transition theory, community-level responses to macro-scalar ruptures usually occur within clearly specified corridors of decision-making that define the majority of possible decision-making pathways. After a transitional rupture, multiple community pathways may emerge. After an initial decline in resilience, communities can implement more resilient pathways in the long-term (Wilson, 2012). However, ruptures can also lead to a long-term decline in resilience - where the relative loss of economic, social, and environmental capital results in a lower adaptive capacity. Wilson and others argue that policy acts as one of the most important factors shaping transition corridors and community response to rupture (Dryzek, 2005; Jordan, 2005; Wilson, 2013).

Wilson's (2013) concept of policy corridors describes the policies exogenous to communities that set the parameters for community action

– policies here are understood as the set of formal rules and regulations largely associated with the state (Martens and Rotmans, 2005; Wilson and Bryant, 1997). These policies affect every community within a nation-state either directly, by guiding human action at the community level, or indirectly, by affecting actions of stakeholders and actors at regional or national levels which, in turn, influences local decision-making (Dryzek, 2005; Winter 1990). The role of policy and other institutional interventions is particularly important in defining, shaping and, at times, distorting, the direction and pace of transitional corridors (Wilson, 2012). Corridors do not emerge in a vacuum but are shaped by previous policies, government and societal ideologies. Wilson (2013) argues that policy is a particularly potent mechanism for raising resilience, especially as policy corridors can influence and shape community transitional pathways. Communities may be more or less prepared to address loss of resilience because adaptive capacity varies based on the severity of propelling forces and the strength of communities' existing assets. As noted earlier, community resilience can often be harnessed through endogenous forces emanating from the community itself (Pretty, 1995). However, there are substantial limits as to how the local level can shape and influence resilience trajectories. This suggests that policies outside of the community may be crucial to helping raise resilience (Wilson, 2007).

Accelerated closures of aging coal plants, increased market competition with natural gas and renewables, and uncertainty regarding future climate change regulation are driving a macro-scalar transitional rupture that will have acute impacts on coal-reliant communities, especially those in remote, isolated communities reliant on employment and revenue. According to transition theory, it is possible for a community facing a rupture to emerge with more resilient post-rupture pathways in the long-term, despite experiencing an initial decline in resilience. In reality, transitional ruptures often lead to loss of economic, social, and environmental capital resulting in long-term decline. Such ruptures are often linked to exogenous forces outside of the community such as environmental disasters such as tsunamis (Rigg et al., 2005) earthquakes (Imperial and Vanclay, 2016), or wildfires (Kulig and Botey, 2016). Community-level responses to ruptures are shaped by transition corridors, and the role of policy is particularly important in defining and shaping the direction and pace of transitional corridors (Wilson, 2012). Therefore, it is essential to examine how the complex and disjointed policy landscape in which the coal transition is taking place enables or constrains resilient community pathways.

3. Methods

This study uses a mixed-methods approach to investigate community transitions, by incorporating policy and document analysis with semi-structured expert interviews to ask the following questions: How has U.S. energy policy changed over time to shape dynamics of coal community transitions? What policies and programs exist at the federal and state level to address socio-economic impacts of the coal transition? How do state approaches vary and what are the implications for the transition corridor? Finally, how are these policies and programs aligned with the needs of transitioning resource-dependent communities in remote regions?

3.1. Constructing the policy corridor

To establish the existing policy corridor(s) this study examines three sets of national and state-level policies that affect the coal transition including U.S. energy policy, state legislation addressing the decline of the coal industry, and transition assistance programs. Data collected to inform the policy review include legislative and policy documents, law and policy reviews, Congressional Research Service reports, government documents, and news articles. These materials seek to provide: 1) an understanding of the evolution of U.S. energy policy, particularly as it relates to coal resource and electricity infrastructure development,

beginning with the enactment of the first comprehensive federal energy legislation in 1975; 2) a characterization of the range of legislation addressing coal industry decline in six western states¹; 3) an evaluation of the existing transition assistance programs available to address economic and labor dislocations caused by the effects of the decline in the coal industry.

Twenty semi-structured interviews with transition policy experts, economic development practitioners, and community planners were conducted to capture expert insights about the implications of the policy corridor for transitioning coal communities. Expert interviews provide specialist professional and technical knowledge, knowledge of organizational procedures and processes, and interpretive and background knowledge of their particular field (Littig, 2011). Recruitment for expert interviews began with a reputational process where participants were contacted based on their positions in federal, regional, or state agencies or organizations implementing transition assistance programs; professional researchers specializing in energy, transition, and/or community development policy; representatives from labor and administrators of workforce service programs; or were practitioners from professional meetings focused on the topic of coal transition (Frank and Hibbard, 2016). Using a snowball sampling approach to identify a network of experts, participant recruitment continued based on recommendations of interviewees until saturation was met (Bickman and Rog, 2009). Interviewees were asked to share their experiences with transitioning coal communities, policies and programs, and opportunities and challenges of transitions in the communities they work. The open ended, semi-structured format follows a general protocol yet allows participants to prioritize and describe in detail the components and concerns that matter most to them and expand on their interest and expertise (Charmaz, 2006). Interviews were conducted between August 2019 and January 2020 and were recorded, transcribed, and ranged from 40 to 70 min in length. Transcripts were coded using an iterative and systematic process of analysis using both *a priori* codes informed by the conceptual framework and inductive coding (Miles and Huberman, 1994).

3.2. Assessing the policy corridor

This analysis characterizes how policy corridors direct or constrain the community transition corridor(s) and is organized as follows: First, because this analysis is positioned to examine the *exogenous* factors, specifically policy, shaping transition in each state. The purpose is to gain a comprehensive understanding of all available transition policy programs and resources available to a community experiencing transitions. Applying Wilson's (2013) logic, the coal transition corridors are linked to previous energy policies and historical events that have important repercussions for local community resilience and vulnerability. Therefore, this paper examines how past U.S. energy policy and processes of making policy influence the existing conditions and dynamics of coal community transitions. Another key aspect of the policy corridor heuristic is the idea that state-led policies and interventions play an important role in shaping the *pace* and *direction* of community transitions (Wilson, 2012, 2013). Thus, this analysis asks how state policy shapes the direction and the pace of the coal transition. Finally, effective rural and regional development interventions should be aligned with the needs of particular communities and appropriate to the economic geography (Haggerty et al., 2018; Ray, 2000; Whitener, 2005). For remote, isolated coal communities, research has stressed the importance of proactive planning before the decline, support in mitigating fiscal impacts, and long-term financial and technical assistance in supporting capacity and ability to self-organize and exercise agency (Bainton and Holcombe, 2018; Berkes and Ross, 2013; Everingham

et al., 2013; Haggerty et al., 2018).

4. Findings and discussion

4.1. Policy corridors emerging in the U.S. Coal transition

4.1.1. Federal policy corridors

Federal efforts to develop the West's coal resources in the 1970s and 1980s were driven by national concerns about fuel scarcity and energy independence and the Clean Air Act's restrictions on sulfur dioxide emissions (Robertson, 1979). Congress passed the United States' first comprehensive and systematic federal energy policy with the Energy Policy and Conservation Act of 1975 (EPCA). By guaranteeing loans for coal mine development, the EPCA encouraged the rapid development of centralized, coal-based electricity infrastructure consisting of new strip mines, railroads, mine-mouth power plants, and transmission lines, exporting electricity from the remote, isolated communities to urban centers in other states (The Energy Policy and Conservation Act, 1976). The geographic market for Western coal exports was expanded with rail freight deregulation initiated by the Staggers Rail Act of 1980. Substantial declines in the mine-mouth price of coal, railroad freight rates, and rail transportation costs led to increased utilization of Powder River Basin coal in power plants across the United States (Gerking and Hamilton, 2008). Early federal policy established the West's coal electricity generation and producing regions as a resource periphery in relation to outside markets (Wallerstein, 2004).

In 1992, the Energy Policy Act removed barriers to private market competition within the wholesale generation of electricity – opening the door for states to deregulate their electricity markets (Joskow, 2000). Several western states deregulated their electricity markets, shifting ownership and regulatory responsibility from the states to market and private actors. While some 're-regulation' has occurred, the legacy of deregulation is evident in the complex ownership regimes of individual plants – in which the ownership portfolio varies in individual generating units as well as across plant assets (Haggerty et al., 2018). For example, Montana's Colstrip Generation Station consists of four generating units owned by six individual entities of varying types including independent power producers and investor-owned utilities (Haggerty et al., 2017). Different types of owners are guided by different incentives affecting decision-making about end-of-life processes. This set of facility stakeholders spans several states, including those that have recently enacted laws to end the use of coal power (Oregon and Washington). Over the years, individual owners have set and reset their exit timelines for earlier dates (Lutey, 2019a). In 2019, Talen Energy announced the early closure of Units 1 and 2, previously scheduled in 2022, a decision that surprised Colstrip city officials (Lutey, 2019b). Past energy policy enables complex ownership regimes that exacerbate uncertainty and undermines the ability to plan for closures.

Since 1975, enactment of U.S. Federal energy policy has shifted from legislative to executive action. Generally, energy policy has been legislated in large, complex bills, occurring every five to ten years and often driven by global energy or financial crises (see timeline in Fig. 2). The Energy Policy Act of 2005 is the most recent comprehensive general legislation, with provisions and authorizations in almost all areas of energy policy (Morehouse, 2020; Yacobucci, 2016). More recent bills have had major energy provisions such as the Energy Independence and Security Act of 2007 and the American Recovery and Reinvestment Act and includes the proposed American Energy Innovation Act of 2020 in the current session of the 116th congress (Morehouse, 2020; Yacobucci, 2016). However, the process has become increasingly politicized with a marked uptick in executive actions. In the last ten years, energy policy has been enacted through executive action, and examples include the Obama Administration's Climate Action Plan, Clean Power Plan (CPP), signing of the Paris Agreement, and Federal Coal Leasing Moratorium. In 2017, the Trump Administration lifted the Federal Coal Leasing Moratorium, repealed the CPP, and announced the U.S.' exit from the 2015

¹ States included in policy analysis are located in the U.S. West and have passed legislation addressing aspects of coal industry decline, and include Arizona, Colorado, Montana, New Mexico, Washington, and Wyoming.

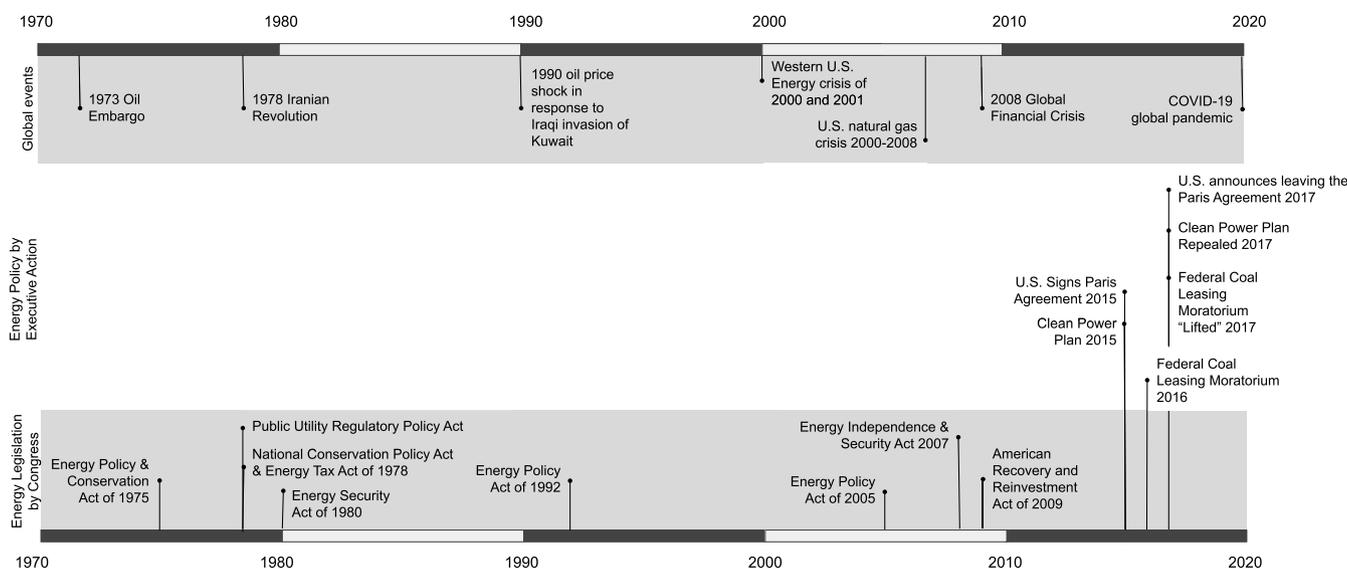


Fig. 2. Timeline of U.S. Federal energy policy 1970–2020.

Paris Agreement.

The absence of a coordinated policy designed to facilitate the energy transition has important implications for the frontline communities (Graff et al., 2018). Key challenges facing coal communities include significant labor disruptions, loss of tax revenue to support public services, and limited opportunities to replace economic base activity (Cates and Eaton, 2019; Godby et al., 2015). The unstable and rapidly changing policies at the national level send conflicting messages, exacerbating uncertainty about the future pace and direction of the transition, when and how the rupture will occur, and how it will affect specific communities (Graff et al., 2018; Mendelevitch et al., 2019). The lack of a guiding framework puts the onus of transition planning on communities with strong economic and cultural ties to extractive industries, which may limit the scope of strategies engaged to mitigate impacts (Freudenburg, 1992; Hudson, 2005). A federal economic development practitioner noted that communities are hesitant to plan for fear of “turning [their] back on a powerful industry that has supported [them] for so long.” At the same time, executing transition strategies requires that communities assess impacts, advocate for mitigation, and negotiate with individual facility owners dispersed across a broad geography (Haggerty et al., 2018). These efforts often come at the expense of comprehensive planning at the local level.

According to energy transition theorists, successful policies that drive transitions are persistent and continuous (Grubler, 2012; Grubler and Wilson, 2014). Erratic stop-and-go policy initiatives are ill-suited for triggering long-term energy transitions, nor do they engender successful policy initiatives that address community transitions (Grubler, 2012). In 2015, the Obama Administration introduced a set of Transition Assistance Programs (TAPs) for distressed coal communities, known as the Partnerships and Opportunity Workforce and Economic Revitalization (POWER) Initiative (Table 1). The POWER Initiative was a multi-agency federal program operating primarily through the Department of Labor and the Department of Commerce’s Economic Development Administration (EDA). In FY2016, \$55 million was appropriated in grant funding and technical assistance to address economic and labor dislocations in communities negatively impacted by changes in the coal industry and power sector (The White House, 2015). In the current administration, elements of the POWER Initiative still operate as a funded program of the Appalachian Regional Commission (Appalachian Regional Commission, 2020). Early POWER programs through the EDA continue today and have been rebranded as Assistance to Coal Communities (ACC). In FY2019, \$30M was designated for the ACC, representing the

fifth consecutive year for the program. It is no longer associated with the POWER Initiative and is identified as a separate program drawing on Economic Adjustment Assistance (EAA) funding. Funding for the ACC programs is appropriated on an annual basis and future funding is precarious, evidenced by the Trump Administration’s efforts to terminate the EDA and its programs (Cecire, 2019).

The existing federal approach to the coal transition does not provide the certainty and adequate support needed in transitioning communities. In an interview, a federal economic development practitioner said s/he saw a decline in individual participation in retraining and workforce assistance programs and attributed the decline to mixed signals from the administration.

They were seeing ... a decline in participation in [workforce retraining] programs after hearing the rhetoric on the campaign trail about the industries coming back. ‘You’ll be back in the mines, just wait, wait, wait ...’ You saw this drop off in folks that were willing to look into other possibilities.

Inconsistent messages dampen individuals and local communities’ willingness to prepare for a post-coal future (Freudenburg, 1992). With tax revenue replacement looming as the greatest challenge facing coal-reliant communities, policy experts call for an approach that transcends politics and directs significant fiscal reinvestment to impacted regions. In an interview, a national energy policy analyst emphasized the importance of garnering bipartisan political support for federal policies that reinvest in impacted communities and regions: “It’s important to emphasize that the communities affected by this are diverse geographically, ethnically, and they are all deserving of reinvestment for what they’ve done for the country over [for] generations.” Several experts recommended intervention that goes beyond existing grant programs and advocated for programs similar to the Department of Defense Office of Economic Adjustment program used to mitigate local impacts of military base closures. An example of such an approach is outlined in the recently proposed federal bill, Providing Recovery Opportunities & Mitigating Industry’s Shifting Economics (PROMISE) Act (H.R.4318), which would provide direct payments to tribal and local governments in Northern Arizona to compensate for revenue losses due to closure at a decreasing rate over the course of seven years. Despite its piecemeal approach targeting a single geography, this bill has been recommended as a template for broader bipartisan legislation supporting federal reinvestment in coalfield communities nationally (Cates and Skrelunas, 2019).

Table 1
Federal funding to support economic transition in coal communities since 2015.

Program	Overview	Fiscal Year	Funding Appropriated
Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Initiative	Introduced in 2015, a multi-agency federal effort to provide grant funding and technical assistance to address economic and labor dislocations caused by the effects of the energy transition. Participating agencies include Department of Commerce, Department of Labor, Appalachian Regional Commission (ARC)	FY 2015	\$28–38 million
POWER + Plan	Intended to develop grant programs across multiple agencies to facilitate energy transition and ameliorate the negative effects of that transition. The FY2016 President's Budget requested \$56M in POWER + grant funds, an additional \$97M in USDA rural development in grants and loans aligned to POWER + Priorities, \$1B for AML reclamation, and \$2B for CCS technology investments. With exception of certain parts of the POWER Initiative and funding for AML, broad elements of the POWER + Plan were not enacted by Congress.	FY2016	\$56 million (Proposed, never enacted in legislation)
POWER Initiative - Appalachian Regional Commission	The ARC is the only organization that continues to receive regular appropriated funding for energy transition activities under the POWER Initiative. The ARC's POWER Initiative program prioritize federal resources and activities in coal communities that produce multiple economic development outcomes, are identified under state, local, or regional economic development plans; and have been collaboratively designed by state, local, or regional stakeholders.	FY2016-2019	\$50 million
Assistance to Coal Communities (ACC)	A grant-making element launched as part of the EDA's role in the POWER Initiative. The EDA continues to receive appropriations for the ACC program. The ACC is no longer associated with the POWER Initiative, instead is a separate program drawing on Economic Adjustment Assistance (EAA) funds.	FY2015 FY2016 FY2017-2019	\$10 million \$15 million \$30 million

4.1.2. State policy corridors

Without a comprehensive national policy framework to address the implications of the coal transition, several Western states have enacted their own legislation to address the impacts of coal industry decline. This review of state policies shows multiple policy corridors and a range of interventions to address social and economic aspects of the coal transition.

In 2011, Washington was the first western state to enact legislation that established closure timelines for both coal-burning units of the state's sole coal power plant. Often pointed to as a model for securing a \$55 million transition fund, Washington S.B. 5769-11 set the longest timelines for closure with Unit 1 scheduled for closure in 2020 and Unit 2 in 2025. In 2019, New Mexico passed the Energy Transition Act (ETA). This bill places air emission caps of 1100 lbs. of carbon dioxide per megawatt hour electricity by 2023, effectively prohibiting coal burning after 2023 (O'Donnell, 2019). The ETA also authorizes qualifying facilities to apply for energy transition bonds, a financial mechanism that allows utilities retiring coal facilities early to recover up to \$375 million in costs of stranded assets, as well as \$30 million in reclamation costs and \$40 million in economic impact support, generated through ratepayer-backed securitization (NM SB489 2019). Both the Washington and New Mexico bills provide examples of state legislation that seeks to manage the pace of coal transition while generating revenue to mitigate impacts of closure.

A main concern of nearly every interviewee was the absence of structures to stabilize and replace revenue losses incurred with the closure of local coal plants and mines. Participants expressed fear of the looming "fiscal death spiral" and "domino effect" caused by the loss of tax base. Previous research emphasized the importance of a transition revenue and investment strategy (Haggerty et al., 2018; Haggerty, 2019). The review of state legislation offered only a few examples of transition funds. Washington's S.B. 5769-11 and subsequent Memorandum of Agreement between merchant power producer TransAlta and the State of Washington outlined the most comprehensive process for establishing a transition fund that would eventually accrue up to \$55 million for workforce retraining, community and economic development, and renewable energy development. New Mexico's recent legislation allocates \$30 million for reclamation and \$40 million for three transition funds – including a fund specifically for impacted tribal communities. Outside of state legislation, there are several mechanisms for securing transition and reinvestment funds (Cates et al., 2020). Through rate case settlement agreements, two of Colstrip's six owners

set aside funds available to the community to address transition – Puget Sound Energy (\$10 million) and Avista Corporation (\$3 million). These policies present a range of transition funds that vary in the ways they are linked to long-term transition strategies, governance processes, who can benefit from these resources, and the extent to which the states assisted with securing these funds.

State policies demonstrate divergent strategies for mitigating the impacts of coal industry declines. Some states are enacting policies that encourage the energy transition away from coal towards renewable sources of electricity, while others are enacting policies that seek to resist or prevent the coal transition by bolstering the coal industry. Examples of the former include recent legislation in Colorado aiming to reduce greenhouse gas emissions, provide securitization, and provide support for transition planning. Similar elements are also found in New Mexico's Energy Transition Act. Meanwhile, other states like Montana and Wyoming, are working to stave off the decline of the coal industry. In 2017, Montana enacted legislation that allows the State Board of Investments to make loans to an owner of a coal-fired generating unit in Montana from the MT Permanent Coal Tax Trust fund for operation and maintenance of a coal-fired generating unit. In 2019, the state of Wyoming passed the "New Opportunities for WY Coal-fired Generation" bill, directing utilities to attempt to find new buyers for coal plants before retiring them and proposing replacement generation. Despite these efforts, coal facility closures continue to be announced as coal production declines in the Powder River Basin (Bleizeffer, 2019; Erickson, 2020; Frosch, 2019).

The policies outlined in Table 2 highlight the range of state approaches to shape the pace and direction of coal industry decline. While no two states are the same, two distinct and diverging types of policy corridors emerge. The first type of corridor accelerates the energy transition away from coal-based electricity and seeks to clarify the pace of transition by setting closure dates or incentives to expedite coal plant retirements. The second type of corridor works to slow the energy system transition by bolstering the coal industry and aims to postpone coal plant retirements. For communities negotiating these policy corridors, the state approach to managing the coal transition has important implications for the socio-economic transition experienced at the local level. First, the policy corridors that accelerate the pace of transition provide certainty and a timeline that informs local transition strategies. For example, a policy expert familiar with the negotiations of the 2011 Washington coal transition bill emphasized the importance of the extended timeline for preparing for workforce and labor impacts.

Table 2

Recent state legislation related to the coal transition in U.S. Western States of AZ, CO, MT, NM, WA, WY.

State	Policy	Date Enacted ^a	Purpose
AZ	E.O. on Climate Change Action	2006	Adopt the goal of reducing AZ GHG emissions to 2000 level by 2020.
	Providing Recovery ^b Opportunities & Mitigating Industry's Shifting Economics (PROMISE Act)	2020 ^a	Direct federal government to reinvest in Hopi and Navajo communities impacted by impending closure of NGS and Kayenta Mine.
CO	Clean Air Clean Jobs Act	2010	Requires CO coal-fired power plants to reduce emissions by 80%.
	Sunset Public Utilities Commission	2019	Reauthorizes the CPUC; adds a 'social cost of carbon at \$46/ton', & the Colorado Energy Impact Bond Act that enables utilities to use securitization bonds for early power plant retirements
	Climate Action Plan to Reduce Pollution	2019	Aims to reduce GHG emissions by 50% by 2030, and 90% by 2050
MT	Just Transition from coal-based electrical energy economy	2019	Creates Just Transition Office and director to create a state Just Transition Plan
	Coal-fired Generating Unit Mitigated Retirement Act	2017 ^a Failed	Require facility operators to enter a formal transition agreement with state officials to outline retirement dates, decommissioning
	Provide for loans to an owner of a coal-fired generating unit	2017	Allows board of investments to make loans to an owner of a coal-fired generating unit in MT from the MT Permanent Coal Tax Trust Fund for operation and maintenance of a coal-fired generating unit
NM	Appropriate money to assist/intervene/plan for closure of coal-fired generation	2017	Appropriates money to the Department of Justice to assist in out-of-state energy proceedings.
	Allow counties to establish a coal trust fund	2019	Allows for the establishment of a coal mine trust reserve fund for county governments
	Energy Transition Act	2019	Mandates NM electricity providers get 80% of their electricity from renewable sources by 2040, & 100% from carbon-free sources by 2045. Allows for 'energy transition bonds' to cover costs associated with abandonment. Does not force closure but mandates creation of standards that drastically limit CO2 emissions from coal plants. Allocates \$30 million for reclamation, \$40 million for three transition funds.
WA	Reducing statewide greenhouse gas emissions	2007	Enacted targets for reducing emissions to 1990 levels by 2020, 25% below 1990 levels by 2035, & 50% below 1990 levels by 2050.
	Relating to coal-fired electric generation facilities	2011	Aims to reduce GHG emissions from coal plants by specifying compliance with emission standards, require the plant to provide financial assurances and enter into MOA with WA governor that includes provisions for the owner to provide financial assistance to impacted community for a total of \$55 Million.
	Concerning coal transition power	2013	Requires utilities to pursue all available energy that is consistent with its PNW electric power and conservation regional plan, with the exception of 'coal transition power'.
WY	New opportunities for WY coal fired generation	2019	Direct utilities to attempt to find new buyers for coal plants before retiring them and proposing replacement generation

^a Policy enacted unless otherwise noted.^b Policy is proposed at the federal level but is designed for a specific region in AZ.

According to the interviewee, an earlier version of the bill setting the closure date for 2015 was opposed by labor stakeholders. More support was garnered by 2020 and 2025 closure dates which provided “more time to plan and to think about the redirection of their workforce.” Longer timelines allow communities to engage in strategic approaches to addressing differentiated impacts of labor changes. Second, despite state efforts to postpone coal decline as long as possible, communities are more exposed to unexpected closures and layoffs. Without access to a planned approach allowing for mitigating the impacts of revenue loss, local municipalities are driving towards a fiscal crisis.

4.2. Examining transition policies and programs ‘on the ground’

4.2.1. Policies do not address needs of remote isolated communities

Discussions with interview participants highlight critical gaps between policy and the needs of remote, isolated coal-reliant communities. Several experts and practitioners identified a central challenge to supporting community transitions is the lack of obvious development options able to replace the coal-based tax revenue, economic base activity, and employment. An economic development practitioner who works for a regional development district describes how this reality affects community stakeholders’ willingness to discuss aspects of transition:

They [would] sit in a room and start talking about transitioning economies, that there’s not a direct replacement for that ... I think that the backfill of revenue support to communities is the piece that we have not figured out well on any level. If we could figure that out, communities would be much more willing to transition.

The absence of structures to address revenue loss was a concern mentioned by nearly every interviewee. In addition, interviewees expressed fear of the loss of critical services and institutions. This challenge presents an important gap between existing programs and what is needed in impacted communities.

Most funding for economic transition assistance comes through the Department of Commerce’s Economic Development Administration (EDA). The EDA provides planning, public works, and technical assistance grants that support job creation and economic development through public infrastructure. Traditional economic development approaches such as the EDA are well-intentioned but are often ill-suited for small, isolated communities. According to a community planner, EDA resources fall short in rural, remote geographies because vulnerable communities lack the ability to link the general planning resources to recommended strategies.

EDA funding does not “promote any strategies that I can tell. I mean, you can do a study, but you have to know what your strategy is to get what you want out of your study. Not to be cynical but you got to tell the people that are doing [the feasibility] study exactly what you’re looking for.

From the perspective of experts on the ground, communities tend to lack a clear vision of what a post-coal economy looks like, and therefore, it is a challenge to leverage federal resources. The community planner also identified a concern is that infrastructure investments may push municipalities into further debt.

Communities that have lost their tax base and now are losing some of their industrial tax base, and now are losing workers who were the customers for the water or the sewer or the new road or whatever it is ... There’s nobody left to pay for it. So, the community is hit once again [and] now you can’t even borrow money.

Currently, there are no federal strategies, from the EDA or otherwise, that directly address the fiscal challenges facing impacted communities.

Practitioners identified a need for facilitated discussions about social and economic impacts of closure and what that might mean for the community’s future. A policy expert involved with the transition negotiations in Centralia, Washington emphasized the importance of an honest assessment of the impacts and timeline of closure. “The reality has to be brought into the room. Okay, this plant is going to close early. Let’s figure out how to make that work for the community, for the

workers, for the environment, and the owners.” These comments align with literature and practice regarding “shrinking cities” which recommend strategies that work to manage or control decline (Hollander and Németh, 2011; Rhodes and Russo, 2013). A community planner spoke of strategies that “[help] downsize or right size the community to whatever it can support without the tax base it once had ... We need to find a way to help them think about the future, even if that future is things like well, we’re going to have to consolidate our schools.”

Several participants underscored the importance of these strategies. However, as practitioners often come from outside of the community, they felt that these conversations needed to be initiated from within the community. This a defining challenge to community transition planning: to be resilient requires cross-scale linkages between stakeholders and organizations and strong institutions that are willing to partner and experiment (Anderies et al., 2004; Besser and Miller, 2013). However, practitioners with relevant expertise and access to resources do not feel they have the license to begin or lead these conversations. So, as one federal economic development specialist described, “solutions [will] need to come from within the community.”

4.2.2. Policies do not provide resources to support early or long-term planning

Previous studies examining economic transitions in resource-dependent counties emphasize the importance of economic diversification and planning before the decline occurs (Rasker, 2017). In addition to proactive planning, transition strategies need to mitigate the immediate impacts and provide support for a long-term, economic transition (Haggerty et al., 2018). Interviews demonstrate that timelines of federal Transition Assistance Programs are incongruent with the needs of impacted communities. Federal and state resources for communities are not available until formal announcements of closure or demonstrated layoffs. For example, in 2017 the Montana Department of Labor and Industry was awarded a \$2 million POWER grant to support retraining of displaced coal workers. However, this funding nearly expired because operator Talen Energy had not announced any layoffs (Lutey, 2019c). Similarly, an economic development practitioner highlighted the challenge of finding resources to support proactive planning in coal-impacted communities in their economic development district.

We have [a] communities that was one of the most impacted by the closure of the coal mines, but they didn’t qualify for opportunities now, because their wages had not decreased during the time in which they were doing the consideration ... That’s one of the challenges ... They’re not always qualified to start the planning process.

POWER and ACC program criteria limit proactive planning efforts. Instead, these resources operate as “emergency assistance” and practitioners are concerned that by the time communities are able to access these critical resources, it may be too late to alter resilience pathways.

In the U.S., existing transition assistance policies tend to focus on the immediate impacts of closure. Economic and community development practitioners emphasized that projects linked to long-term solutions take time, and it is important to understand “that you’re not going to come in with a three-year grant and save the community.” As many of these grants operate on short-term funding cycles, practitioners are asking for support that can be linked to long-term economic development goals.

4.2.3. Existing transition support is insufficient

Policy experts are calling for larger investments and greater external support for affected communities and workers than the existing programs, like the ACC, provide. A tax policy expert with a national public policy research firm assessed that federal intervention is key:

Federal resources are going to be critical because it’s hard to ask a state that’s going through a fiscal crisis to solve its own problems. Then, there’s the communities themselves ... when you’re in this fiscal death spiral, how are you supposed to redevelop your community into a place that has a sustainable economic base?

Experts argue that impacted communities and regions may need

long-term reinvestment “orders of magnitude higher than [existing] grants or loans ... it will be on the order of billions per year for 10 years. I wouldn’t do it forever. I mean it’s a transition ... but I do think 10 years might be about the right length.” Policies that support major reinvestment in impacted communities and regions may be key. Interview participants emphasized the importance of these place-based investments.

Now, why if your family is from Gillette, Wyoming and has been for years, you know for generations, should you be expected to go live in the suburbs of Denver and find a job? Along the same lines, we look at coal communities as places that have contributed to the economic growth of the U.S. for generations, and we feel like it’s a cause for a just transition for a job well done.

Interviews with key informants highlight the need for federal transition assistance of a much greater scale that is tailored to the specific needs of these coal impacted communities and regions.

5. Conclusion and policy implications

As the pace of the energy transition accelerates in the U.S., the effects of federal and state policy on transition impacts in coal-dependent regions and how to provide meaningful opportunities and tangible resources that support communities are pressing policy concerns. This study makes two sets of important contributions. First, this study expands the application of Wilson’s transition theory framework (2012) to examine the relationship between policy and community resilience in the context of the U.S. coal transition, demonstrating the applicability and explanatory power of what has been a fairly abstract, ungrounded conceptualization of ‘transitions’. Second, this research provides new insight into how the existing policy landscape shapes transition planning at the community level, with important implications for policy reform which we summarize here.

Past energy policies have created the core-periphery dynamic and complicated ownership regime that thwarts transition efforts in remote coal communities. The absence of a coordinated national energy policy exacerbates uncertainty for coal communities and leaves it to states to establish their own legislation, resulting in a range of strategies and levels of support. Two distinct policy corridors emerge among states reviewed in this paper. The first corridor accelerates the energy transition and seeks to clarify the pace of transition by negotiating closure dates or incentives to expedite coal plant retirements. The second corridor works to slow transition by bolstering the coal industry and aims to postpone coal plant retirements. While it is too soon to know how community pathways will be shaped by these policy corridors, both the literature and expert interviews agree that strategies that provide more certainty around closure dates, provide time and resources for early planning, and secure transition funds better equip communities to navigate transitional ruptures.

Findings from the policy analysis and interviews with experts and practitioners highlight several opportunities to improve policy to address the coal transition. At the federal level, there is a need for comprehensive legislation that coordinates the energy transition by establishing clear timelines and strategies for transition; mandates a comprehensive assessment of impacts of closure; and identifies strategies to mitigate social, economic, and environmental impacts of closure. In coordination with energy transition policy, federal assistance programs for coal communities need to be significantly expanded in terms of scope and scale. Policy experts are calling for long-term, predictable funding for assistance programs and significant reinvestment in impacted communities and regions. More flexibility is needed in how grant programs can be used to better meet the needs of vulnerable communities. One example of how criteria of programs can be adjusted is to enable access to federal resources before closures are officially announced.

Interviews with practitioners highlighted limited capacity and weak ties to state and federal actors key as challenges to strategic and

meaningful transition planning. One solution to address these challenges is to facilitate and support coordinated regional planning that integrates energy system and economic development approaches. Building long-term capacity and ‘thick’ institutional relationships through rural regional planning supports community and regional resilience (Healey, 1998; Morrison, 2014). Experts interviewed point to the Appalachian Regional Commission as a potential model to create cross-scalar networks and leverage existing resources needed to bring planning expertise and geographically sensitive approaches to community transitions. Finally, to address the problem of stabilizing and replacing revenue losses states need to remove barriers to saving revenue and expand the range of financial tools that enable communities to unwind fiscal dependence on coal revenue (Haggerty et al., 2018).

Further research should continue to examine the factors shaping community and regional path creation. Empirical assessments are needed to understand, recognize, and strengthen the endogenous capacities and social processes that communities enact to overcome challenges and navigate change. In a moment of increasing environmental and economic uncertainty, scholars, policymakers, and practitioners need to broaden our theoretical and practical toolset to grasp the emerging opportunities and transcend the rising challenges in resource regions.

CRedit authorship contribution statement

Kelli F. Roemer: Conceptualization, Methodology, Investigation, Formal analysis, Writing - original draft, Project administration. **Julia H. Haggerty:** Conceptualization, Methodology, Writing - review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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