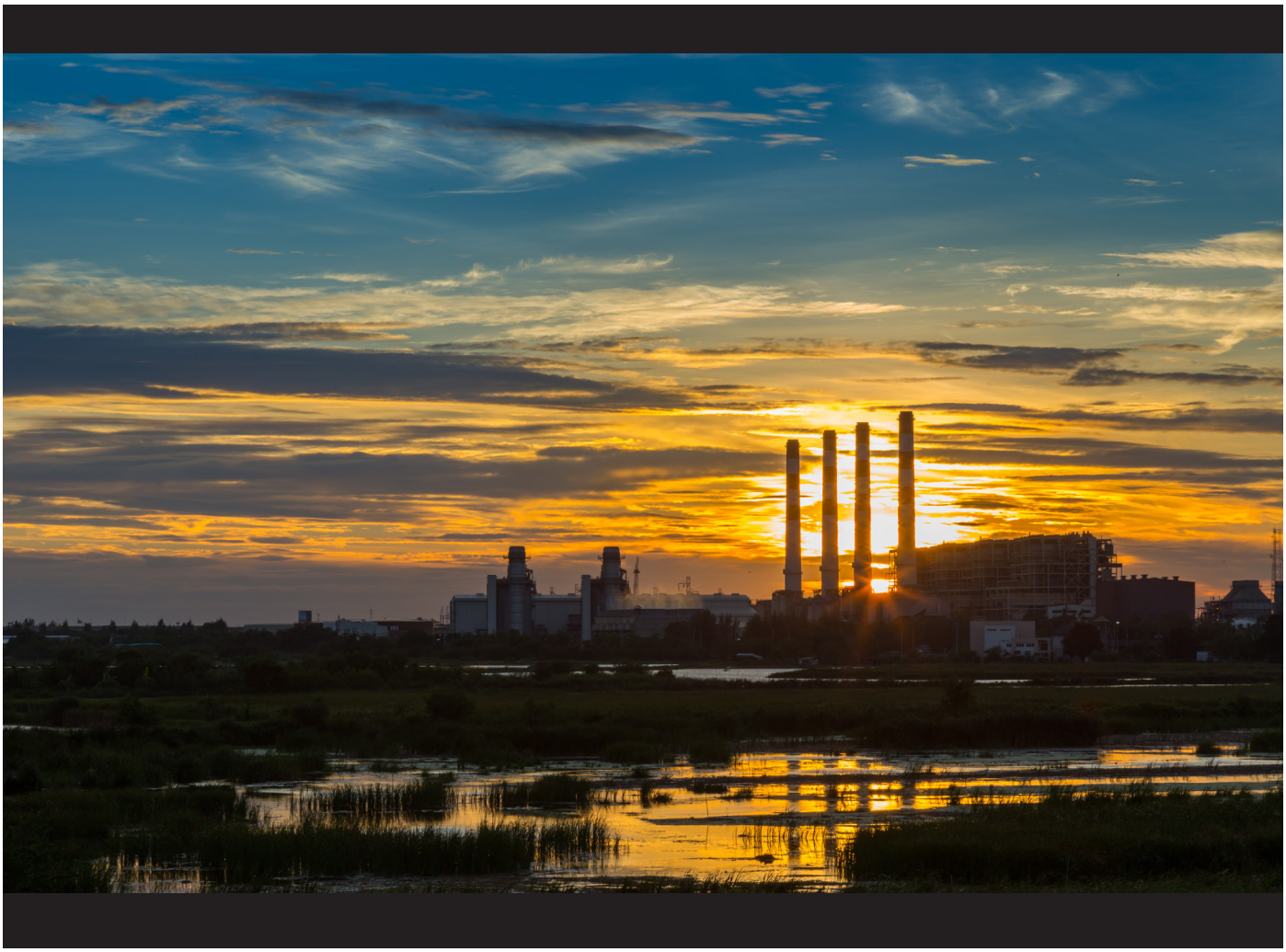
EPRI

JUST TRANSITION: AN OVERVIEW OF THE LANDSCAPE AND LEADING PRACTICES



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Synopsis

In the context of the energy industry, a "just transition" refers to equitable access to the benefits and protection from the risks associated with the shift to a low carbon economy for workers and communities, which usually involves closing a fossil power plant but can include consideration across the full value chain including delivery (e.g., transmission siting, microgrid development) and utilization (e.g., energy efficiency programming development, electric vehicle infrastructure investment). The objective of a just transition is to support/drive/enable more sustainable economies whereby workers and communities – particularly, though not solely, historically disadvantaged communities – do not bear an inordinate cost or burden from the transition.

The impacts from industrial transitions of any kind can include job losses, local supply chain and retail declines, lower local tax base and revenues, and loss of personal and community identity. Moreover, the clean energy transition is occurring as larger political, societal, and economic influences may compound the challenges of a community facing fossil plant closure. Replacement industries and jobs may present lower wages, skills gaps, and geographic challenges necessitating relocation or travel.

Every community is unique. There is no specific set of policies and processes for a just transition. Successful communities have employed a range of actions across the transition spanning worker assistance, adjusting public services, economic diversification, and efforts to maintain community morale. Pursuing a just transition for each community facing plant closure can involve a diverse coalition including the utility or asset owner, governments, non-governmental organizations, community members, educational institutions, businesses, and other industries. Risks and concerns for different actors and stakeholders are real and often high; what is best for the company, displaced workers, governments, and the community long-term may not align.

Assessing impacts, challenges, and opportunities is critical for pursuing a just transition and crafting realistic mitigation strategies. The adaptive capacity of a community to progress to a more sustainable economy is driven by several factors including resources, economic diversity, and workforce readiness and well as the level of engagement in and strength of local government and non-governmental organizations (i.e., civil society). Recognizing that each community and situation will be different, characterizing the current state and subsequent impacts of plant closure is a key first step. This includes identifying the economic and social factors present in the community and how these would be affected by plant closure.

Along with this current state assessment, characterizing the challenges to economic development and resiliency – either brought on by the transition or already present in a community – is needed to develop realistic goals and meaningful strategies and plans. Conversely, the community may exhibit attributes and circumstances that present economic and other opportunities to advance a just transition.

Developed through desktop research, including a review of recent academic literature and case studies, this research into approaches and leading practices summarizes a suite of processes, policies, investments, and other actions that may be successfully applied. Leading practices and essential goals of a community in transition include dedicated funding for community support and economic development, co-development of community projects that advance sustainability, training and employment support, and facilitating industrial redevelopment. Severance and retirement packages, retraining, and relocation assistance are important, but these don't assure a just transition.

Lessons learned include starting early, recognizing divergent interests among key players, proactive human capital management, understanding the costs and resources for key aspects of the transition effort, leveraging government policies and funding sources, and tailoring strategies to local circumstances.

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This white paper was prepared by EPRI.

This paper is not exhaustive as it recognizes but does not dive deeply into the macro political, societal, and economic trends and policies that influence a given community's situation. Nor does this paper discuss international contexts where the federal or state governments may provide significant funding and support to communities and individuals experiencing such transitions. It provides a foundation for those seeking to understand just transition and how companies and governments are pursuing a just transition.

Key Takeaways:

1. Approaches for pursuing a just transition to sustainable economic development and more resilient communities will vary and include building capacity and coalitions in the community; establishing commitments among industry, government, and non-governmental organizations; and making strategic investments.
2. Supportive conditions for impacted communities include resources and programs in place to assist individuals and the community through the transition; economic diversity and related industries providing places of employment; education and career support available to displaced workers and their families; and processes and capacity for engagement and advocacy.
3. Leading practices include dedicated funding for community support and economic development, co-development of community projects that advance sustainability, provide training and employment support, and facilitate economic development.
4. Lessons learned include starting early, recognizing divergent interests among key players, proactive human capital management, understanding the costs and resources for key aspects of the transition effort, leveraging government policies and funding sources, and tailoring strategies to local circumstances.

Introduction and Background

Context

The concept of "just transition" arose as the impact of lost jobs in coal mining and fossil power generation was growing; and employment losses in impacted industries remains a large, if not primary, part of the concept of just transition today that includes community impacts related to these industrial shifts.[1] In January 2021, Executive Order 14008 established the Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization, whose initial report identified a list of communities facing significant hardship from coal mine and coal plant closures that should be prioritized for federal investment.[2] Focusing on both "fenceline" and "energy-impacted" communities likely to face adversity from the clean energy transition, this working group aims to promote job creation, infrastructure funding, remediation, community development, innovation, workforce development, and economic development.

Although overall traditional energy production is dispersed throughout the United States, Executive Order 140008 ranked communities by percentage of total direct coal jobs relative to all employees in the Bureau of Labor Statistics' metro and non-metro areas and are largely in coal mining areas. Four of these regions (Appalachian, Four Corners, Illinois Basin, and Mid-Continental Gulf Coast) are also home to 12 of the top 20 coal power plants by power generation capacity. Power sector wages are well above the national average and represent a significant share (> 5%) of the wages in 49 counties across the United States.[3] According to the Bureau of Labor Standards, power sector jobs provided over 10% and up to 32% of the wages in 10 counties in Alabama, Illinois, Louisiana, Montana, Mississippi, North Carolina, Ohio, and Oklahoma from 2016 through 2019.

Just Transition

EPRI describes just transition as "equitable access to the benefits and protection from the risks associated with the shift to a low carbon economy for workers and communities."[4] Related issues include energy justice (i.e., accessibility and affordability), environmental justice (i.e., disproportionate impacts from industrial pollution), and climate justice (i.e., burdens of climate change experienced by the disadvantaged).

> *Just transition, as an Emerging Sustainability Priority for the North American Electric Power Industry, is described as, "Equitable access to the benefits and protection from the risks associated with the shift to a low carbon economy for workers and communities."[5] (EPRI Report 3002021526)*

Most definitions for just transition refer to achieving a transition to more sustainable economies whereby workers and communities do not bear an inordinate cost or burden from the transition.[6] These burdens or impacts from such transitions can include job losses, local supply chain and retail declines, lower local tax base and revenues, and loss of personal and community identity. Replace-

ment industries and jobs may present lower wages, skills gaps, and geographic challenges necessitating relocation or travel. Despite these challenges, there may be environmental benefits from ceasing or altering plant operations; and a cleaner environment from ceasing operations, remediation, and restoration can provide community benefits.

Strategies for pursuing sustainable economic development and more resilient communities will vary – as impacts and opportunities are specific to the situation – but the literature reveals some common leading practices that include starting early; building capacity and coalitions in the community; establishing commitments among industry, government, and non-governmental organizations that support the future and livelihoods of workers and communities; and making strategic investments.[7]

Strategies to Advance a Just Transition

- **Starting early**. In coal mining and fossil fuel production areas, early preparation is required to tackle complex issues to identify organization responsible for managing the transition and ensuring that funding is available when industries decline.
- **Building capacity and coalitions.** Affected communities must be involved in discussions early enough alongside a variety of other stakeholders and public authorities to ensure needs can be addressed.
- **Establishing commitments.** Put in place commitments among industry, government, and non-governmental organizations that support the future and livelihoods of workers and communities.
- **Making strategic investments.** Dedicated funding for community support and economic development can include co-development of community projects that advance sustainability, proactive training and employment support, and facilitating economic development.

It should be noted that decarbonization and the clean energy transition – along with accompanying calls for a just transition – are occurring as inequality is increasing in society.[8] Larger societal and economic influences may compound the challenges of a community facing fossil plant closure. Scholars argue that this challenge requires a more holistic and interdisciplinary approach than a focus on the triggering event (e.g., decarbonization leading to plant closure).

This white paper focuses on the implications and opportunities faced when decarbonization significantly impacts fossil plant-dependent communities. It provides a foundation for those seeking to understand just transition and how companies and governments are pursuing a just transition. Specifically using fossil plant closure as the premise, this paper's observations and learnings may be applied to repowering and related transitions that can affect a community's economic, political, and social conditions. Moreover, recognizing that plant ownership and political jurisdictions vary, these case studies and references reflect domestic and international experiences and observations as well as those from other industries.

EPRI's Strategic Sustainability Science Program

Expectations of utilities regarding sustainability commitments and performance are rising as utility customers, investors, employees, and other industry stakeholders become more engaged in the sustainable energy dialogue. As corporate strategies advance beyond regulatory compliance to a comprehensive focus on driving value through economic, environmental, and social responsibility, electric power companies need ways to embed sustainable practices into day-to-day operations and strategic long-range planning. EPRI's Strategic Sustainability Science Program (P198) identifies and develops the tools and resources that utilities need to integrate a sustainability mindset throughout their organizations. In addition, the program serves as a nexus bringing sustainability thought leaders together and propelling forward-thinking scientific research and analysis. Finally, EPRI's work to define and benchmark sustainability priorities and metrics can offer insights into advancing a just transition.

Previous EPRI Work

EPRI's Equitable Decarbonization Initiative launched in early 2021 to jumpstart equity conversations, identify research gaps, and assess EPRI research capability to lay the foundation for a new, multi-year research effort. This collaborative, comprised of energy companies and industry stakeholders including academics, NGOs, regulators, and community leaders, is designed to facilitate sharing and development of leading practices; elevate leadership through a commitment to collaborative dialogue and research; explore metrics and screening tools to better understand environmental justice, energy

burden, energy insecurity, energy access, and energy poverty; and facilitate stronger, more inclusive community advisory structures.

EPRI's recent white paper, *Equity and Environmental Justice Considerations for a Clean Energy Transition*, contributes to this initiative by building on existing efforts to help assess impacts of power plant closures and new energy facilities on economic activity, employment opportunities, the tax base, land use, and environmental footprint from energy infrastructure. The paper presents key areas of decarbonization with equity dimensions and the role of research in informing policy, technology, and program development.[9]

This was preceded by EPRI's 2019 Technical Update titled *A Comprehensive Approach to Repurposing Retired Coal Plant Sites*.[10] This paper's key findings included:

- Case studies illustrate that it is possible to successfully repurpose retired coal power plants for non-energy-generation uses.
- "Comprehensive repurposing" (defined in the report as "a comprehensive process for implementing redevelopment of decommissioned/retired power plant site," may provide an efficient path to successfully implementing new life for retired coal power plants.
- A key barrier to comprehensive repurposing may be the "organizational stovepipes" (also known as organizational silos) found within many utility companies.
- Comprehensive repurposing has the potential to unlock certain beneficial public funding streams earlier in the process than is typical.

Sustainability performance can ameliorate key barriers to comprehensive repurposing and illuminate the nontraditional value created by such projects.

This technical update also identified the following steps for a utility owner to drive a comprehensive repurposing process:

1. Establish Senior Management's Commitment
2. Create an Internal Repurposing Task Force
3. Conduct a Fleet-Wide, High-Level Repurposing Feasibility Evaluation
4. Prioritize the Fleet for Repurposing
5. Implement a Comprehensive Repurposing Approach for Higher-Priority Sites
6. Prepare and Issue Individual Redevelopment RFPs for Highest-Priority Sites

Methodology

To capture a broad understanding of just transition, EPRI conducted a literature review considering a wide range of relevant topics and sources including academic journals, reports on strategies and frameworks, and applicable practitioner news sources from a range of outlets. As of June 2021, Google Scholar returned about 13,000 results for "just transition" across an international range of issues; searching for "just transition" related to fossil fuels (i.e., just transition + fossil fuels returned over 8,000 results spanning both extraction and power generation across the globe. Narrowing the search to just transition related to fossil plant and community (ie just transition + fossil plant + community) still returned over 2500 results. After scanning abstracts and summaries, references were selected that focused on understanding the issue as it relates to implications and opportunities for workers and communities impacted by industry closures. This research was supplemented by similar Google searches to include perspectives from government and non-governmental organizations' publications. Case studies discussed in the literature were of particular interest; and many of the literature sources used in this work compiled case studies and lessons learned. Together, these provided the compilations of issues and leading practices that are synthesized here.

Limitations

As noted above, this paper recognizes but does not dive deeply into the macro political, societal, and economic trends and policies that influence a given community's situation. Nor does this paper discuss international contexts where the federal or state governments may provide significant funding and support to communities and individuals experiencing such transitions.

Findings represent information and views during the course of this project (June-September 2021), and the selection of works was heavily dependent on Google's determination of relevance to the search terms used by the research team and the results of this study are based on the works returned by the algorithms. It is possible that additional peer reviewed literature could be found utilizing additional research databases that could further build out an understanding around just transition. Further, other case studies and topics may have been identified from additional keyword searches.

In addition, this paper does not detail EPRI's ongoing work related to plant management and employee skills, site operation and remediation, and related environmental and operational impacts and opportunities as plants approach and execute closure. This information and research results may be obtained through work published by other EPRI research programs including, but not limited to:

- Ecosystem Risk and Resiliency (P55)
- Endangered and Protected Species (P195)
- Water Quality and Effluent Guidelines (P240)
- Coal Combustion Products Land and Groundwater Management (P242)
- Plant Management Essentials. (P255)

Despite these limitations, the results of this study can serve as the basis for informing discussions among internal and external electric power industry stakeholders around just transition.

Structure

The findings of this literature review have been broken down into four focus areas:

1. **Case Studies** describing significant efforts to advance just transition in the electric power and other industries.
2. **Impacts, Challenges, and Opportunities** which are critical for pursuing a just transition and crafting realistic mitigation strategies.
3. **Leading Practices** derived from case studies and related research provides a suite of processes, policies, investments, and other actions that may be applied.
4. **Key Findings and Applications,** including a proposed model for decision-making tool/checklist, to support strategic community transition plan development and execution.

Case Studies

These case studies were selected from the United States and other developed countries with similar economic and social conditions to illuminate examplesand provide a suite of processes, policies, investments, and other measures that may be applied to advance a just transition. These include dedicated funding for community support and economic development, co-development of community projects that advance sustainably, training and employment support, and facilitating industrial redevelopment. Additionally, the academic literature reviewed for this paper drew heavily from a wide array of case studies contributing to this research's leading practices and key insights.

Retraining and Reskilling for a Just Transition

Appalachian Sky

Coal consumption in the United States has been declining since its peak in 2007.[11] This is due to a combination of low natural gas prices, less costly renewable generation, and more stringent environmental regulations. The loss of coal-related jobs and tax revenue has hit the Appalachian regions of Kentucky, Ohio, Virginia, and West Virginia, and the subsequent economic and social pressures on the region as livelihoods and basic government services suffer when industrial activity declines.[12]

To address this issue, a solution lies in boosting the readiness to work of the current workforce (i.e., transferrable skills) so that displaced individuals can seek new employment while simultaneously boosting economic development. In 2017, American Electric Power (AEP) joined regional partners to launch Appalachian Sky, an initiative to attract aerospace and aviation companies to the area.[13] A regional partnership of government, business, and local leaders embarked on a regional workforce analysis funded in part with AEP economic development grants; the analysis concluded there were eight times the national average of skilled metal workers in the region.[14] Research showed that coal miners and steelworkers, many of whom lost jobs as plants retired, have the skills (welding, soldering, brazing machine setters, operators) that many aerospace and aviation companies need. Regional partners then worked with an aerospace consultancy to determine the viability of an industry in the Appalachian region. A total of 37 counties were identified and certified as AeroReady, which assures aerospace companies that there is a supply of labor, and that necessary infrastructure is in place.[15]

To support the creation of new high-tech businesses, the utility's foundation awarded Marshall University in Huntington, West Virginia a $750,000 grant to establish an aviation program.[16] In addition, AEP also supports and sponsors the New River Gorge Regional Development Authority's (NRGRDA) efforts to set the stage for growing the aerospace industry in six south West Virginia counties. In 2020, the regional group submitted a request for funding through the Appalachian Region Commission's POWER initiative to help fund training of displaced workers to work in the aerospace industry.

These cumulative efforts help to pair the aerospace and aviation industry with displaced yet highly skilled workers in the coal and steel sector and also helps communities and regions affected by the clean energy transition.

Organizational Coalitions for a Just Transition

Appalachian Regional Commission

Launched in 1965, the Appalachian Regional Commission (ARC) is an economic development partnership agency of the federal and 13 state government to invest with local, regional, and state partners to enhance opportunities that transforms communities, creates jobs, and strengthens regional economies.[17]

A report commissioned by ARC, *An Overview of Coal and the Economy in Appalachia*, illustrates major trends in coal employment and production, and what has driven declines over the past two decades.[18] The reduction in the cost of natural gas and an adverse regulatory environment that increased the cost of burning coal for electric power generators are cited as two factors that have depressed demand.

The commission's Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Initiative was created in 2015 to target federal resources in communities that have been particularly affected by job losses in coal mining, coal power plant operations, and coal-related supply chain industries. Since its inception in 2015, ARC has invested over $287.8 million in 362 projects touching 353 counties.[19] These investments are projected to create or retain nearly 35,000 jobs and leverage $1.5 billion in additional private investment, while preparing thousands of workers and students for opportunities in other industries in a region that continues to be impacted by the downturn of the coal industry.

The spillover effects of overall coal production and demand decline have altered the economic and demographic characteristics of many communities across the region. Alongside the drop in coal industry employment, total private-sector employment in counties with the highest dependence on the coal industry has fallen substantially. This had led to a reduction in the prime working age population and median wages.[20] ARC aims to help communities and regions affected through annual grants to state and local agencies and governmental entities, local governing boards, nonprofit, organizations, Indian tribes, and higher education institutions.

In September 2021, ARC alongside the Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization (IWG), announced more than $46 million for 57 projects across 184 counties to support economic diversification and social capital. Projects include bridging the digital divide by building fiber networks as well as apprenticeship and training programs in counties that have experienced a large decrease in mine employment.

The deployment of funding for each phase of the transition that allows for sufficient planning and development is crucial for a successful transition. Coalition-building and information-sharing such as ARC can help to leverage resources locally, nationally, and globally to meet regional social and economic needs.

Building Just Transition Work Early

Centralia Power Plant

Centralia Power Plant is a 670-megawatt (MW) coal-fired power station owned and operated by TransAlta in Centralia, Washington.[21] Opened in 1972, the plant is the only commercial coal-fired power plant in the state. As part of legislation passed in 2011 to reduce greenhouse gas emissions, mercury, and nitrogen oxide pollution, then-Governor Christine Gregoire signed into law the "TransAlta Energy Transition Bill" which called for the closure of its coal-fired boilers in two phases.[22] In December 2020, TransAlta retired Unit 1 with Unit 2 set to retire at the end of 2025.

The transition agreement between policymakers, environmentalists, labor leaders, and the power company gave Centralia more than a decade to prepare for its closure to recoup its investments and to set aside $55 million for the Centralia Coal Transition Grants program.[23]

The grant program funds local businesses, non-profit organizations, and local governments working towards three areas: energy efficiency, workforce and economic development, and energy technology. The transition plan created a board for each area to receive annual payments and distribute grants. The three boards operate independent of TransAlta and are comprised of volunteer members of company and local leaders:

- Weatherization Board ($10m): Funds energy efficiency and weatherization for residents, employees, businesses, non-profit organizations, and local governments, with specific efforts to assist low- and moderate-income residents.

- Economic and Community Development Board ($20m): Funds education, retraining, economic development, and community enhancement, with the bulk targeting the needs of workers displaced from Centralia, including but not limited to direct support for displaced workers.
- Energy Technology Board ($25m): Funds energy technologies with the potential to create environmental benefits for the state of Washington.

Since its inception, the boards have funded numerous efforts, including solar projects and electric transportation for public schools; trade school, vocational programs, and apprenticeship scholarships; and energy efficiency efforts at local religious and health organizations.

The Centralia Coal Transition Grants program funds local businesses, non-profit organizations, and local governments working towards energy efficiency, workforce and economic development, and energy technology.

More recently, the fund approved a grant to support a feasibility study for long-term battery storage next to the existing Centralia Power Plant in collaboration with the Pacific Northwest National Laboratory (PNNL). The study is expected to take nearly a year and will examine the value and benefits as a basis for determining whether TransAlta will move forward with redevelopment efforts.

Other funding provisions include payments for workers laid off now and those who remain until the plant's closure in 2025. All will receive a one-time lump sum payment of $44,000 and have the option, including their spouses, to apply for education grants of up to $15,000, helping to bolster the community's readiness to work.

By starting conversations nearly a decade before the first of the two generating units were shuttered, stakeholders and community members found that early planning was critical in order to bring people together to find resources to generate new growth.

Site Reuse Planning for a Just Transition

Enel Green Power

Enel Green Power is an Italian multinational renewable energy corporation headquartered in Rome. The company was founded in 2008 inside power generation firm Enel Group to develop and manage its assets in 21 countries with a focus on the energy transition and growing its renewable capacity.[24]

In Spain, Enel has a significant footprint with 286 power plants.[25] The company is actively engaged in transitioning to an emission-free energy model through the decarbonization of its operations, which involves closing coal capacity within the next decade.

Cognizant of the impact of the energy transition in the communities it serves, Enel has developed a roadmap for all its coal-fired power stations with the concept of a just transition that considers the needs of those more exposed to change.[26] The company's "Futur-e plans" coalesce around four thematic areas:[27]

- Proactive job search for directly affected staff members.
- Promotion of economic activities and employment in the area, including renewable energy projects.
- Education and training for those directly affected and maximizing the percentage of local people employed on projects in the area.
- Initiatives to boost municipal sustainability where the plants are located and working with local officials to seek new ways to promote energy efficiency.

At its Litoral de Almeria Coal Power Plant in southern Spain, the company's "Futur-e plans" involve launching an international invitation to tender proposals that find industrial projects that will be able to house new growth projects that will create jobs in the local area. The company emphasizes the site's potential for industrial development due to its proximity to an international airport, two major roadways, and a port terminal, which allows for logistical integration at the plant site.[28] All parties interested in developing the site must complete a social, occupational, and environmental impact assessment that considers the needs of the area, business vitality and the ability to create employment.

To aid in the transition, Endesa is utilizing the expertise of its personnel to provide specific and personalized programs to equip affected workers with new skills in business development, plant management and maintenance, digitalization, security, and training in the latest technologies.[29]

This effort (i.e., the Futur-e plans for the Litoal de Almeria Coal Power Plant) is just one of 38 efforts that make up Enel's 'Creating Shared Value' plan. This plan aims to pair asset transition plans with stakeholder dialogue to ensure the creation of new initiatives that enhance the wellbeing of communities is safeguarded. To date, these

programs have benefited 4000 people, and all have been co-designed alongside and with input from their target communities.

Enel's "Futur-e Plans" and Endesa plant transition demonstrate the commitment needed to mitigate the impact that closures may have on local populations. Based on an open and collaborative process with local and global stakeholders, the company is applying a shared value and circular economy model that finds a second life for decommissioned plants that guarantees a future for the site and surrounding areas.

A Just Transition Informed by Local and Historical Experiences

Hazelwood Power Station Australia

Traditionally recognized as the center of energy in the southeastern Australia, the Latrobe Valley produces 85 percent of the electricity for the entire state of Victoria.[30] The area is home to some of the highest-emitting thermal power stations in Australia, most of which already closed or are scheduled to close.

Since rich lignite, or brown coal, was discovered in 1873, the Victorian government, led by the State Electricity Management Commission (SECV), encouraged communities to move to the area with public housing, infrastructure, schools and high wages, which displaced the indigenous Aboriginal population, as well as smaller purpose-built towns.[31] The region continued to flourish through the 1960s as allied industries grew (i.e., logging, pulp and paper mills, and natural gas and oil); however, the SECV remained the region's largest provider of employment and main source of income throughout this time. This changed from the 1980s onwards as the privatization of the national power industry resulted in extensive job losses and regional decline. In the Latrobe Valley, the number of power industry jobs dropped from a pre-restructuring peak of 10,000 in the late 1980s, to 1,800 by 2002 as plants closed.[32]

Hazelwood Power Station, located in Latrobe Valley, was the most carbon intensive electricity generator in Australia prior to its closure in 2017 and was an icon of the country's ongoing struggles over climate and energy policy. Plant owners provided only five months' notice before closure. This created significant challenges for the workers, households, businesses, and governments seeking to preserve jobs and investment.[33]

On the same day the closure of Hazelwood was announced, the state government introduced a A$266 million transition package and created the Latrobe Valley Authority (LVA) to coordinate the transition and economic development in the area.[34] The LVA is also in charge of managing an additional A$40m specifically set aside to support 15 initiatives for workers, businesses, and communities.[35] Examples include:

- **Back-to-work VIC Scheme:** Provides employers with payments of up to A$9,000 to hire and train unemployed people in the Latrobe Valley and retrenched workers from the Hazelwood power station
- **Latrobe Valley Economic Facilitation Fund:** A$10m to Identify and support business growth and new job creation, consistent with priorities set out in local economic development plans and strategies
- **Latrobe Valley Community and Facility Fund:** Distributes A$5m to deliver energy upgrades of A$4,500 each to households in the valley, which a focus on those on social welfare

The government also announced a institutional innovations to improve government capacity in relation to region, including a cabinet taskforce and a call center and website to provide affected workers with access to information and support.

Since the plant's closure, unemployment dropped from a high of 8.3 percent the year prior to 4.5 percent in July 2020.[36] Successes include renewable energy companies like Gippsland Solar and Earthworker Cooperative who employ ex-Hazelwood workers and have set up local manufacturing in the region. A 300 megawatt wind farm has been proposed near the plant's original site with construction slated to begin in 2022, and developers have pledged more than A$3m a year to the local community.[37]

The regional policy and strategic interventions outlined earlier alongside the many collaborative parterships (i.e, creation of institutional foundations) allowed for a more flexible approach to mitigating adverse impacts. A well-managed transition must include respectful and inclusive engagement with workers and communities that is informed by local history, exeperience and expertise.[38] While advanced noticed may have made the transition far easier and further work is needed, promising initial progress has been made in creating a foundation to facilitate a more equitable and resilient Latrobe Valley.

Impacts, Challenges, and Opportunities

Recognizing that each community and situation will be different, characterizing the current state and subsequent impacts of plant closure is a key first step. This includes identifying the economic, political, and social factors present in the community and how these would be altered by plant closure. Along with this current-state assessment, understanding the challenges to economic development and resiliency – either brought on by the transition or already present in a community – is needed to develop realistic goals and meaningful mitigation and plans. Correspondingly, the community may exhibit attributes and circumstances that present economic and other opportunities that advance a just transition. While presented here as separate and distinct areas for assessment and evaluation, it is important to consider that a particular community's impacts, challenges, and opportunities are likely to be complex and interrelated.

The following presents key elements to consider in evaluating impacts, challenges, and opportunities associated with plant closure. These elements and the discussion that follows were derived from the literature and the case studies which presented common themes, observations, and activities.

Impacts

The potential economic and social impacts from plant closures include job losses, local supply chain and retail declines, lower local tax base and revenues, and loss of personal and community identity.

Job losses can include direct, indirect, and induced jobs.[39] Direct jobs include operations and maintenance at existing plants as well as construction and development of new energy projects. Indirect jobs include those that supply the plant with fuel and materials as well as those necessary to support the plant (e.g., quality assurance, regulatory). Induced jobs are those associated with these direct and indirect employees and their families' spending (e.g., food, transportation, clothing, education, recreation). The economic impacts from plant closure can extend beyond individual job losses and associated reduced household spending and saving (i.e., wealth). The economic impacts may include local and regional retail and commercial contraction as well as lower donations for local religious and other non-profit entities, thus hindering their missions. Plant closure and associated job losses may highlight and exacerbate challenges facing marginalized or disadvantaged communities such as energy burden and poor infrastructure, including lack of internet access.[40]

Plant and company analysis about employees' tenure and skills can inform expected direct job losses when coupled with managing retirements and reassignments. Understanding and identifying employee demographics can inform opportunities to mitigate job losses, such as the option of gaining severance instead of continued employment for eligible workers.Other company operations with similar required skillsets may be able to absorb employees and mitigate job dislocations. Additionally, post-closure decommissioning, demolition, remediation, and restoration may provide continuing employment.[41] Mitigation may involve retraining, apprenticeships, and relocation or travel support; bridge assignments for those nearing but not yet eligible for retirement are another potential mitigation technique. Assessing these factors can help determine the final number of job losses and induced impacts.

Lower tax base and tax revenues stemming from plant closures could result in local government budget cuts and associated reduced public services and investments (e.g., schools, public health, infrastructure).[42] Evaluating the local government's revenue sources attributed to the plant and its operation (e.g., property taxes, sales and use taxes) can characterize this impact. Correspondingly, a lower tax base may cause tax rates to increase, further burdening those struggling economically.[43]

Economists can conduct an Economic Impact Assessment (EIA) for a quantitative analysis of how disruptive events such as plant closures will impact economic indicators; commonly deployed economic impact models include input-output (I-O) models and computable general equilibrium (CGE) models.[44] While not every transition may necessitate an extensive economic assessment, understanding the facets and extent of the potential impact can be central to planning appropriate mitigation.

The social impacts span individual, family, and community. Individuals experiencing job loss can also face loss of belonging, purpose, and sense of self as well as substance abuse and depression.[45] Family and social structures are altered when earners change roles or take jobs requiring travel or relocation.[46] Fundamentally different future job opportunities present generational shifts in careers.[47] Community impacts encompass culture and sense of place, especially where the plant and its employees were involved in community events. This qualitative assessment may be more difficult than quantitative economic analyses, but these social impacts have been reported in the literature and could be avoided by a just transition.

The outcome of plant closure, especially if replacement jobs are found elsewhere, may be a diminished community or even relocation and abandonment.[48] The implications for a smaller community may include restructuring schools and services and planning for abandoned properties. Planning, particularly with community member participation, can ease the future impacts of these plant closures. Such procedural equity, incorporates the pre-exsiting conditions that facilitates a community's access to procedures, resources, and benefits.[49]

Challenges

Pre-existing and underlying factors can present challenges to achieving a just transition when a community is faced with plant closure. The adaptive capacity of a community to progress to a more sustainable economy is driven by several factors including resources, economic diversity, workforce readiness, and civil society such as organizations, unions, and affiliated actors.[50] Financial conditions such as debt and insufficient resources can hamper both local governments and individuals' ability to withstand the transition.[51] A lack of economic diversity and few industries offering similar jobs can be a key issue for communities losing a large employer, and the lack of skilled workers may hamper efforts to attract and retain new industries.[52] A community's institutional and organizational capacity may hinder engagement and action. Where these challenges are few or mitigated, the impacts of plant closure may be lessened.

Resources for unemployment benefits, economic development, retraining, and other essential services and needs are important to understand; and the availability of these resources throughout the transition, which may take years, is also important to understand to adequately plan and provide for ongoing needs.[53] Understanding both the amount of support available and how long that support can last is critical for governments and individual or family resources. Dedicated funding and/or reserves contribute to resiliency and flexibility when expected revenues and incomes change. The transition may be mitigated to the extent that people who live in the community and the local government itself have access to resources (e.g. governmental budget reserves, grants, loans, direct assistance) to apply to their intermediate fiscal challenges and needs until incomes and revenues are restored or stabilize. Economically disadvantaged areas and entities could pre-date the transition; evaluating and including these historical and enduring factors in strategic planning could focus resources and programs where there are gaps and needs in consideration of both today's communities and historically disadvantaged regions.

Governments and their bond holders could face risks of default to the extent their revenues and associated debt service are derived from the local fossil plant, including its indirect economic activity and associated taxes.[54] These risks are not limited to investments in energy projects or facilities but extend to debt for infrastructure, schools, and other projects as well as for "general obligations" that fund ongoing operations. Another risk related to fossil plant communities is their ability to borrow and the interest rate a municipality must pay.[55] Risks related to the clean energy transition are increasingly being taken into consideration by financial institutions and investors.[56]

Industrial redevelopment such as repowering a power plant site or recruiting new industry are potential mitigation measures can be highly dependent on the availability of appropriately skilled labor. Moreover, replacing one large employer with another may not increase resiliency if that industry is not sustainable. Additionally, replacing coal-fired plants with natural gas generally employs fewer workers and may require different skills; renewable energy facilities require even fewer workers who may need to be multi-skilled.

Readiness for work is also a concern for the impacted individuals seeking new employment. Whether to find work in their community or to relocate for employment, transferable skills are an important factor. Retraining and further education opportunities – both "on the job" as well as at local schools and community colleges - provide some communities with an advantage over those communities without this educational infrastructure.

Civil society (i.e., organizations, unions, and affiliated actors) can hamper or advance the transition to a more sustainable economy.[57] Local stakeholder engagement and committed support among key decision makers can help a community work through the changes brought on by plant closure.[58] In addition, the relative roles of federal, regional (e.g., state, province), and local governments needs to be understood. The adaptive capacity of the community to take greater control of their future is an important factor to understand. Capacity- and coalition-building can delay or impede progress where these structures are weak or unclear and where goals may be misaligned; so, this presents a vital early step in the process.

Opportunities

The challenges discussed above and in the synthesis of case studies and research present mitigating opportunities for impacted communities. Beneficial conditions include resources and programs in place to assist individuals and the community through the transition; economic diversity and related industries providing places of employment; education and career support available to displaced workers; and processes and capacity for engagement and advocacy. These attributes have the potential to advance a just transition and support specific opportunities such as industrial and non-industrial redevelopment, environmental conservation, and community development.[59]

Industrial developments utilize access to infrastructure (e.g., rail, water, highway, transmission, gas, fiber) for manufacturing or data centers.[60] Energy-related examples include multi-use battery and microgrids, community solar, renewable energy on coal ash ponds or other plant lands, indoor agriculture, and transportation electrification hubs.

Environmental restoration may address contamination and pollution issues and subsequently provide opportunities for green space, wildlands, and recreation. Environmental development could involve wetland, stream, forest, and habitat restoration and creation to generate ecosystem services credits. Environmental amenities can support attracting new businesses, tourists, and residents.

Non-industrial redevelopment examples for community and local business purposes could involve waterfront access, beautification, historic preservation, and rehabilitation and reuse of industrial buildings. Community development, particularly post-closure, may include attracting tourism and new households driven by quality of life, access to broadband, and proximity to metropolitan areas and/or natural resources.

The suitability – and likelihood of success – for development and redevelopment opportunities depend on site and regional specifics including community goals, market analysis, land use compatibility, infrastructure optimization, environmental stewardship, and social equity priorities in vulnerable communities. Subsequent strategic planning and redevelopment decisions could benefit different stakeholders unevenly; for example, replacement industry would benefit displaced workers while redevelopment may benefit small community businesses. The literature review revealed that more successful communities employed a range of actions across the transition spanning worker assistance, adjusting public services, economic diversification, and efforts to maintain community morale.[61]

Leading Practices

Research into frameworks and planning for plant closure revealed common themes around understanding the impacts, challenges, and opportunities described above as well as the importance of stakeholder engagement and a shared vision for the future within which the approaches and activities described below are undertaken. The following discussion of goals and lessons learned was derived from this paper's references that presented comparable and analogous findings and conclusions. Key goals for a successful community transition identified in this research focus on acceptance of the transition, economic development, revenue replacement, and environmental reclamation.[62] Moreover, stable employment is noted as important for a just transition.[63] Lessons learned from case studies and the literature include starting early, recognizing divergent interests among key players, understanding the costs and resources for key aspects of the transition effort, and tailoring strategies to local circumstances.[64] Also, these leading practices – agreement on goals and acting in recognition of lessons learned – apply broadly to all of the partners involved in the transition.

Goals for a Successful Community Transition

Transition Acceptance

Characterized by shared vision, managing conflict, and openness to external ideas and support, social capital and civil society engagement and cohesion can be important to effective mobilization and successful transitions.[65] Positive outcomes have been associated with plans and strategies that accurately acknowledge economic conditions, recognize the need to diversify local economies, and leverage the community's own resources and opportunities. Moreover, the literature recognizes a difference between mitigating the immediate impact of plant closure and pursuing the long-term viability of the community – both are important for a just transition.

Economic Development

Community planning and collaboration are important to successful diversification and stabilization, with a key goal to transition workers to sustainable employment.[66] However, economic develop-

ment often involves engagement and expertise from beyond a local community.[67] Economic forecasting, scenario planning, and creative strategies require information, modeling capabilities, and insights that may not be available in the community. Regional and network approaches can advocate for and leverage potential opportunities, incentives, and partnerships, yielding broader benefits.

Stable Employment

Transitioning workers to sustainable employment may be dependent on economic development. A leading practice is assessing the labor market and developing an inventory of the skills profiles, demographics, and locations to inform current and potential employers for current employees.[68] Additionally, intentionally using displaced workers in these projects helps to bridge their employment and continue to support indirect and induced economic activity in the region. Even with these opportunities, workers may need help with securing a new job, income support, education and skills building, re-employment, and mobility.

Revenue Replacement

With an understanding of the community's revenue sources and needs, investing in savings, infrastructure, and economic development can stabilize the area's economy and ease the transition.[69] A fiscal strategy may include leveraging special taxing authorities and proactive diversification supporting an array of businesses, services, and amenities that advance the workforce and enhance quality of life in the community. A local community's fiscal plan may include leveraging available state and federal monies (e.g., direct payments, special funds, grants, loans) and may require restructuring local services. Timetabling plant retirement and decommissioning, property tax and related revenue streams, job losses and offsets through remediation and redevelopment, and their direct, indirect, and induced economic activity including tax revenues can help a community plan and prepare for the future.

Environmental Reclamation

Following decommissioning and required remediation, undertaking appropriate environmental restoration can ease the transition and facilitate redevelopment by offering suitable sites that support the community's economic and community development objectives. Future use should determine the restoration plan as industrial uses (e.g., repowering, manufacturing, data center) may not need the same remediation and restoration as commercial (e.g., school, retail, office) or environmental (e.g., park, open space) uses.

Lessons Learned

Timing

A key lesson learned reported in the literature is to start early, engaging stakeholders and the community in proactively planning for the future – even in the face of uncertainty.[70] Consensus and coalition-building may not be straightforward if community members and stakeholders disagree; yet the literature shows that they need to come together for a successful and just transition.[71] Subsequently, economic diversification also takes time, as does redevelopment and new development. Specifically for owners contemplating plant closure, this may mean greater transparency and communication regarding strategies and plans.

The time required for the transition can involve distinct phases and approaches. Expanding beyond crisis management and immediate recovery, transition spans pre-closure, the period following actual closure announcement, and the long-term transition. Key transition processes and activities include community visioning, revenue replacement, and economic and community development. Successfully forging agreements and plans take time to foster, develop, and realize.

Assessment

The community's specific challenges and opportunities influence its resiliency and ability to affect a successful transition. Taking stock of a community's assets and opportunities can provide valuable input to visioning and planning as well as to subsequent economic and community development marketing. These factors include workforce skills and availability, availability of tax incentives and grants, regional economic activity and supply chain, and local amenities.

Understanding the site's challenges and opportunities is critical for successful redevelopment. These factors include available infrastructure (e.g., utilities, transportation, water), zoning and land use, and cost benefit comparison for remediation. Assessing the appropriateness and ability of neighboring communities to assimilate or accept changes in use, traffic, emissions/discharges, viewshed (the natural environment that is visible from one or more viewing points), and other impacts is important to a just transition. Measuring disproportionate and cumulative impacts can inform decision making and mitigation.

Engagement

Case studies reveal that no single actor can take responsibility for and successfully navigate a just transition; and lessons learned demonstrate the effectiveness of collaboration and stakeholder engagement.[72] Stakeholders including government, industry, and civil society organizations need to work together to avoid or mitigate the distributional impacts and undue burdens that can result from the clean energy transition.[73] Affected workers and communities are primary stakeholders; and unions and employers have key roles.[74]

The literature goes further to describe the importance of the key roles for each major player. Studies spanning experiences in the European Union and Australia, where local and national governments largely lead sustainability and just transition efforts, to experiences in the United States, where the federal government plays less of a role, show that coalitions including quasi- and non-governmental actors can be impactful.[75] Quasi-governmental actors may include commissions, special purpose committees, and partnerships.

Governments create and enable policy and provide key services. The plant owner plays an important role by being transparent about its plans for decommissioning, remediation, reuse, and for directly impacted workers. Other industries and businesses may be potential employers and support community visioning and economic development. Community organizations (e.g., unions, service organizations, non-profits) can support morale and communications and play a practical role in programs such as retraining.

Recognizing that goal alignment among the stakeholders may be a challenge, the role of "bridge builder" may be important to drive groups who normally function in siloes (e.g., coal workers, environmentalists) toward consensus. Research has shown that local groups with existing, long-term community relationships tend to be more successful bridge builders than national groups.[76] Moreover, company, worker, and community welfare are often interdependent, and a bottom-up process shaped by local actors working toward common interests is a leading practice.[77]

Policy

Federal, state, and local government policies can play a significant role in a community's transition.[78] Embedding just transition principles in planning, legislative, regulatory, and advisory processes include public involvement, communication, and reporting on progress.[79]

Federal or state government policies and support may include direct payments or grants to local governments, authorities for tax incentives for business development or payroll expansion, and regulatory assistance for site rehabilitation and economic development. State and local government policies and support may include tax reductions for impacted individuals and businesses, incentives such as property and other tax reductions for economic development, and other concessions appropriate for communities facing an economic dislocation.

Human Capital Management

Proactive human capital management can ameliorate plant closure and associated job losses.[80] Examples include selective hiring or a hiring freeze in anticipation of closure and coordinated transfer opportunities as other company operations may be able to accommodate dislocations and mitigate the final number of job losses and induced impacts. This mitigation may involve retraining, apprenticeships, and relocation or travel support. Proactively shifting workers to available jobs elsewhere in the company may necessitate backfilling with contractors or rehiring recent retirees to fill in until actual closure. Bridge assignments for those nearing – but not yet eligible for – retirement provide another potential mitigation including work on decommissioning, demolition, remediation, and restoration. Finally, opportunities encompassing severance and benefits extension, bridging employees to full retirement, can provide incentives or mitigation for early retirement.

Training and education for displaced workers may extend beyond internal company programs, local community organizations, colleges, and universities.[81] Partnerships and initiatives among utility, other companies and industries, and governments should ensure a focus on future economic opportunities and may include families and children of displaced workers as a leading practice to ensure a more just and sustainable transition.

Investment

Managing the transition and addressing its impacts will involve resources, and it is important to determine and reconcile the needs, their costs, the organizations responsible (e.g., plant owner, government entity, non-profit foundation), their sources or nature of the funds (e.g., drawdown of reserves, loans, or grants) and the assumptions upon which they are based (e.g., post-redevelopment increased economic vitality and future tax receipts).

A wide range of mitigation and development costs may be incurred spanning severance, unemployment compensation, retraining, replacing lost tax revenues, site restoration, recruiting incentives, and infrastructure for new development or to address local priorities. Some of these funds may be near- or short-term, some may be provided as a bridge to a more sustainable economy, others may be recurring (e.g., annual revenues for operating budgets). Funding local transition centers in affected communities may provide critical resources for support and communications.

> *"Pursuit of a just transition does not prescribe a specific set of policies and processes; rather, it encourages a shared vision and inclusive planning and decision-making that involve all affected actors in a way that is tailored to local circumstances." Carley and Konisky*[82]

Compensation

Compensation can take several forms addressing immediate and enduring needs. For immediate needs, companies or entities closing a plant may provide severance and retirement packages, retraining, and relocation assistance which the literature cites as leading practices. It is worth noting the company's financial health is a relative advantage for North American utilities when compared with international and other industry examples such as some mining and manufacturing closures.[83] As to enduring needs for those facing loss of income, support and mitigation for household budgets may be considered; the literature mentions providing or improving accessibility and efficiency in infrastructure including internet, energy, water, and transportation.

Key Takeaways

Strategies for pursuing a just transition to sustainable economic development and more resilient communities will vary because each community is unique. Supportive conditions for impacted communities include resources and programs in place to assist individuals and the community through the transition; economic diversity and related industries providing places of employment; education and career support available to displaced workers; and processes and capacity for engagement and advocacy. Even with these advantages, pursuing a just transition often requires intention and planning.

Considering the leading practices and lessons learned revealed through this research can advance a just transition for communities facing plant closure. Approaches for pursuing a just transition to sustainable economic development and more resilient communities include building capacity and coalitions, establishing commitments, and making strategic investments.

Leading practices include dedicated funding for community support and economic development, co-development of community projects that advance sustainably, training and employment support, and facilitating economic development. Lessons learned include starting early, recognizing divergent interests among key players, proactive human capital management, understanding the costs and resources for key aspects of the transition effort, leveraging government policies and funding sources, and tailoring strategies to local circumstances.

The following provides a checklist of key issues to consider and highlights metrics or considerations to incorporate.

Key Topics to Consider for a Just Transition

Assessments	Impacts/Opportunities
Jobs and Economy ☐ Direct ☐ Inderect ☐ Induced	**Economic Models** ☐ Number of jobs and salaries ☐ Contracting wages and spend ☐ Local businesses
Local Tax Base and Revenus ☐ Public services ☐ Infrastructure investments	**Government Information** ☐ Scope and cost ☐ Planned and needed
Personal and Community Identity ☐ Mental health ☐ Family structure ☐ Sense of place	**Qualitative** ☐ Mental health services ☐ Primary earners/roles ☐ Culture/morale
Resources ☐ Existing Debt ☐ Savings/Fund Balances ☐ Loans/Grants/Direct Assistance	**Government/Local Banks** ☐ Local government and individuals/families ☐ Availability
Economic Diversity ☐ Industries offering similar jobs ☐ Industrial and non-industrial redevelopment ☐ Environmental conservation ☐ Community development	**Market Analysis** ☐ Number/location/salaries ☐ Jobs/economic effects and infrastructure needs ☐ Land use/support ☐ Infrastructure/land use/businesses
Workforce ☐ Demographics ☐ Skillsets ☐ Educational institutions ☐ Company programs	**Human Resources** ☐ Age/years to retirement ☐ Applicable jobs ☐ Re/training ☐ Re/training and educational assistance
Civil Society ☐ Unions ☐ NGOs ☐ Civic engagement ☐ Political engagement	**Qualitative** ☐ Job training, other assistance ☐ Roles/involvement/assistance ☐ Extent of involvement/influence ☐ Extent of involvement/influence

Lessons Learned for Plant-Closure and Community Transition

Conclusion

Pursuing a just transition for communities facing plant closure can involve a diverse coalition including the utility or asset owner, governments, non-governmental organizations, community members, educational institutions, businesses, and other industries. The challenges are real, and the opportunities vary, yet working together toward common goals of a just transition and sustainable economy can be supported by leveraging the approaches and practices discussed in this paper.

This research revealed the importance of starting early to build capacity and coalitions and, recognizing divergent interests among key players. This research also highlighted the importance of understanding the costs and resources for key aspects of the transition effort and establishing commitments for strategic investments and dedicated funding for community support and economic development. Impactful actions include co-development of community projects that advance sustainability, proactive training and employment support, and facilitating economic development.

The case studies and related research revealed an array of ideas for practices and approaches that may be applicable for other communities. Employment practices include providing alternative job opportunities, severance, education and training, benefits extensions, and retirement bridging. Community development approaches include funding energy efficiency, infrastructure such as broadband, and small business incubators. Economic development opportunities include attracting industries with similar skills and site requirements, environmental restoration for ecosystem services, and repowering with cleaner energy sources. Practices and approaches tailored to each plant and community are more likely to be effective.

Researchers are continuing to study the effects of climate policy and its subsequent equity and justice implications. There is a need for ongoing research as the clean energy transition proceeds. The efficacy of programs and initiatives designed to foster a just transition will play out over time. Reassessments and longitudinal studies of communities facing these transitions could illuminate influencing factors and the effectiveness of interventions.

List of Abbreviations

AEP	American Electric Power
CDC	Centers for Disease Control and Prevention
CGE	Computable General Equilibrium
CSV	Creating Shared Value
EIA	Economic Impact Assessment
EPRI	Electric Power Research Institute
GHG	Greenhouse Gas
GW	Gigawatt
I-O	Input-Output
MW	Megawatt
NRGRDA	New River Gorge Regional Development Authority
PNNL	Pacific Northwest National Laboratory

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Endnotes

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