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Working sunset to sunrise: union strategies in three California climate transitions

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ABSTRACT

We evaluate the conditions and consequences of union strategies in three industrial transitions in California, all driven by its globally influential climate policies: in construction (solar power plants), electricity (nuclear power retirement), and manufacturing (electric vehicles). Building on recent, global frameworks in environmental labor studies, we grow the field's attention towards unions with workers transitioning between 'sunset' industries like fossil energy and 'sunrise' sectors like clean energy. Using original ethnographic and archival data, we analyze the conditions that shaped union strategies in transitions, and how these in turn impacted union power and coalitions. We argue that union strategies embraced climate transitions when they organized leverage to define a shift on their members' terms, independently from employers, often by turning environmental regulation to the advantage of labor and its allies.

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Introduction

Experts on climate politics increasingly look to organized labor as a pivotal force, but to very distinct ends. For some, unions in the US and other nations have 'captured' policymaking to 'control climate politics' for their narrow interests (Mildenberger 2020, Grubert and Hastings-Simon 2022); for others, unions are an 'already existing and organized base of social power' whose revitalization could win climate action and upend social inequality at once (Cha *et al.* 2022, Huber 2022). Meanwhile, activists and elected officials advocating a Green New Deal or 'just transitions' for dirty industries have increasingly sought union alliances as a key lever of change (Schlosser 2021, Vachon 2023).

To evaluate how worker power shapes climate transitions, few terrains offer the long experience of California. Since renewable electricity mandates in 2002, and a 2006 law making it 'the first state in the nation to

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cap greenhouse gas emissions', California's climate and energy laws have been a global model (Danny and Victor 2020). California's labor movement is strong relative to the national average, as exemplified by its solar power plants: built overwhelmingly with union labor, in contrast to 90% non-union work on solar energy nationally (Luke *et al*. 2017, Foster 2020).

In this article, we evaluate California construction, electricity, and manufacturing transitions linked to climate mitigation. We analyze the conditions and strategies with which workers' organizations shaped the trajectory of transitions, including by building coalitions, and show how their strategies reshaped their power in these sectors. Aiming to inform effective labor actions for climate justice, we respond to the call of *Environmental Politics* editors for 'scholarship that focuses on marginalised communities and social struggle… at the intersection between activist and academic knowledges' (Hayes et al. 2021).

We build on Kalt's recent framework of labor-climate transition strategies, which argues that unions act in industrial transitions with an overall goal to expand their collective power in industrial transition (Kalt 2022). We show how differences in unions' associational and structural power (Wright 2000) equipped them differently to influence transition trajectories, with implications for their ability to build power through transition.

We find that unions won leading roles in climate transitions when their members proactively built coalitions with labor and community partners, independently from their employers, and organized to advance green shifts on terms that grew the power of workers and their allies. Solar construction was our case that followed this successful model most closely, with unions using their growing leverage in a transition to racially integrate, build community allies, and steer the next stages of transition. At a major nuclear power plant, a highly organized utility union wielded political influence in an employer-forged coalition, which fractured from community allies once political and economic shifts made extended nuclear operation viable. In electric vehicle manufacturing, a concessionary spiral and lack of assertive organizing from the key union limited its ability to challenge hostile employers, driving members and new leaders to shift to a more confrontational strategy this year.

The next two sections establish our framework and methods for evaluating worker strategies. Then, we share findings from our three California case studies. The following analysis section identifies common threads from the cases for how worker power shaped transitions. We conclude with directions for future research on power in climate transitions, including for movements beyond labor.

Evaluating workers' power in transition

The growing field of environmental labor studies has assessed the shifting politics of labor movements regarding climate and ecological crises (Räthzel et al. 2012; Räthzel *et al.* 2021). Union transition strategies are often categorized as 'oppositional' (opposing change); 'reactive' (minimizing risks of change); or 'affirmative' (embracing climate transitions and their opportunities) (Kalt 2022). This literature has largely focused on oppositional and reactive strategies in so-called 'sunset' industries, like fossil fuel extraction, which face nearly guaranteed job losses under planned climate transitions (*ibid.*; Prinz and Pegels 2018). In his study of coal transitions in South Africa and Germany, Kalt (2022, p. 19) found that, '[i]n unions that straddle both sunset and sunrise industries, incumbent interests tend to have greater weight than pro-transition forces.' Our study seeks to expand the base of evidence and deepen analysis on this crossroads between 'sunset' and 'sunrise'.

Our three cases involve unions that span 'sunset' and 'sunrise' sectors, facing job transfer and growth opportunities in climate transitions, but also stark losses from drawdown in dirtier parts of their sector. Political economists have argued that construction, utility, and manufacturing sectors have some of the greatest potential for both job growth and worker leadership in climate transitions (Zabin et al. 2020; Huber 2022). Though outstanding environmental labor research has addressed these sectors, it focused on cases of heavy job loss (Gingrich 2012; Cha et al. 2022). In transition cases where unions are faced with both potential expansion and decline – which we term 'crossroad industries' – our study evaluates what conditions support unions' affirmative transition strategies, and these strategies' consequences for workers' organizations and allies (2021). In transition cases where unions are faced with both potential expansion and decline – which we term 'crossroad industries' – our study evaluates what conditions support unions' affirmative transition strategies, and these strategies' consequences for workers' organizations and allies

While earlier works in environmental labor studies largely sought to explain the 'environmental policies of trade unions' (Räthzel *et al.* 2021) as demonstrated by formal resolutions, a growing contingent have studied practical union actions as measures of transition strategy, such as community organizing drives, legislative campaigns, and lawsuits or strikes against polluting or job-cutting employers (Barca and Leonardi 2018; Snell 2018).

This practical turn in environmental labor studies received its clearest framework yet in Kalt's (2022) study of German and South African union strategies, predominantly in the coal industry. That study concluded that unions' essential aim in transitions was to 'expand their power', instead of simply improving members' job security or income. We take up that focus on

power as a primary goal of union strategies, and like Kalt's study, define worker power in two dimensions based on Wright (2000): *associational power*, referring to the strength of organization by which workers take collective action in the workplace, community, and state; and *structural power*, often based on limited labor supply, limited mobility of production, or time-sensitive roles in the industrial process.

Since all our cases are in California, our analysis can compare how workers in various sectors charted distinct strategies on a shared terrain of regulation and political economy. By process tracing how workers' organizations assessed conditions, then built and exercised power in transitions, our cases identify union strategies and their outcomes for climate action and social justice.

Our research questions contribute to the literature by assessing how union activists perceived their key conditions, practices, and outcomes of building and exercising power. Our first research question is: *what conditions shaped union transition strategies?* While Kalt broadly defined conditions like 'socio-economic context', 'public discourse', and 'internal structures' as pivotal, in our California climate transition cases, we sought to identify the more specific forms of these conditions that union members and leaders found most important in shaping their strategy.

Our second question is: *how did workers build and exercise collective power to enact transition strategies?* Instead of seeing power as a finite resource to be spent judiciously (e.g. Prinz and Pegels 2018), we draw on labor scholars who see worker power as built through members' practices of collective, democratic action, especially in challenges to employers (Parker and Slaughter 1988, McAlevey 2016). Another potent action can be building active alliances with other labor or community groups, as environmental labor studies have sought to support since its inception (Räthzel *et al.* 2021). Our framework builds from literature on coalitions that showed these bonds were shaped by union democracy, racial inclusion, and shared labor-community struggles over health and family social reproduction (Burgmann 2000, Barca and Leonardi 2018).

Finally, we ask: *what were the outcomes of union transition strategies for worker power?* Based on union activist perspectives and outcomes like contract gains, we compare the consequences of union climate transition strategies for shifting workers' associational and structural power, in and beyond the workplace.

Methods

To evaluate three climate transition cases in California, we adopt the 'process tracing' method used in comparative politics, which is well suited for small collections of qualitatively rich case studies like ours (Collier 2011). Process

tracing assesses the mechanisms by which certain independent variables (in our case, political and economic conditions) influence dependent variables (distinct union strategies) and thereby shape outcomes (implications of transitions for workers' power). With a narrative assessment of transition mechanisms in a focused comparison of three cases, we can glean broad lessons about *how* conditions can shape union strategy and outcomes.

Research for our cases collected ethnographic and archival data from 2018 through 2023. The principal ethnographic methods were semi-structured interviews, both phone and in-person, which began with an interview guide and proceeded along themes which subjects identified as important (Longhurst 2003). For each case, over 10 interviews were conducted, generally with leaders, staff, or member activists from the involved unions involved, and for some cases with external actors. To grasp rank-and-file perspectives, interviews with members form evidence for two of our cases, while public records and news accounts of member perspectives inform the third. Observation at public meetings developed contacts, quotes, and context. For two cases where unionists identified their coalitions as crucial, we interviewed organizers from allied activist or nonprofit groups. We do not individually cite interviews, but perspectives shared in multiple interviews are summarized as perceptions of union members or leaders.

Archival methods included extensive review of public records, journalistic coverage, and public online posts from union officials or activists. This evidence is cited when it provides the principal source of claims, most often regarding conditions and past organizing efforts shaping union strategy in transitions. A specific account of interviews and other field methods is provided in Table 1.

Transition case studies

Construction: solar power plants

As solar energy reached a record year of US growth in 2020, jobs in the industry were 94% non-union, including nearly all distributed or rooftop installation roles (Foster 2020). Construction workers in unions have a general advantage in pay (+49%) over those who are non-union, which is greater than the union margin in all but one other occupation (Bureau of Labor Statistics 2021). Since 56% of construction workers nationally are Latinx, while 91% of construction managers are white, labor-management relations structure a hierarchy of race and citizenship, raising the stakes for worker power in the sector (*ibid.*).

California is a national outlier for the conditions of solar labor. Researchers and union officials estimated over 90% of California's utility-scale solar construction jobs were unionized as of 2020, with a majority

Table 1. Overview of field methods by case study.

Sector	Area	Time period	Types and numbers of interviewees	Additional methods
Construction	Fresno, CA region	June 2019 - September 2021	Union construction workers (19); Local union leaders and staff (15); Allied organizers (6)	Observation at meetings of unions and community activists (7)
Electricity	San Luis Obispo, CA	April - December 2020	Union representatives (2), non-profit organizers (5), adjacent activists (1), employer representatives (2)	Review of public records in state agency archives (legal filings, union members' testimony at public hearings, transcripts of regulatory meetings); news reports
Manufacturing	San Jose and Inland Empire regions, CA (and auxiliary interviewees in MI, MO)	January 2021 - April 2023	Union auto workers (15); Union or caucus staff (7); Industry activists and researchers (11)	Participant observation at union activist meetings (8); Worker blogs and news reports

Latinx union workforce (Luke *et al.* 2017). These utility-scale solar projects comprised 68% of the state's solar capacity by 2015, halfway through a decade when solar generation grew nearly thirty-fold in California, reaching 15.4% of all electricity made in the state (California Energy Commission 2020). This boom was aided by vast conversions of drought-dried farmland into solar power plants (Kasler 2019). This standout solar unionization overcame that state's clean energy legislation, to date, never set explicit labor conditions in law.[1]

Construction union leaders claim they successfully unionized California's solar boom by building and leveraging power on three fronts. First, beginning in 2002, California construction union leaders actively supported state renewable energy mandates, winning over hesitant legislators with prospects of new union jobs in their districts. Second, unions successfully lobbied these mandates to require largely in-state renewable construction, which was then subject to union pressure. Third, with a 'permit intervention' approach first used versus gas power plant developers during their 2000s boom, unions pressured renewable energy developers to unionize, or else face labor's stifling opposition to environmental permits for their projects. According to a union lobbyist, solar developers facing a 'very competitive' market found that 'the cost increment from non-union to union labor was trivial', compared to prospective project delays from permit battles with labor.

Formed by union design, this time- and location-constrained solar market secured construction workers' structural leverage. Two key unions also compromised with solar developers by initially accepting a lower-paid, lower-job security 'helper' classification for basic solar installation roles, covering roughly half of jobs for electricians and ironworkers.

Construction unions' took advantage of their structural leverage by offering what could be termed a 'reproductive fix' to the making of a workforce for the solar transition (Brown 2023). In the words of an Ironworker leader in Fresno, California: 'We provide skilled labor. It's what we do.' As utility demand for renewable power ramped up, developers sought to build vast solar plants in rural areas of the state, often requiring hundreds of construction workers on a tight schedule to meet state mandates. Building trade's apprentice training, hiring halls, and peer-to-peer jobsite mentorship formed a longstanding, in-house engine for worker recruitment, training, and dispatch. That associational power offered a fix to the workforce reproduction problems developers faced for swiftly meeting their labor demand in remote regions.

With this leverage over workforce provision and state project approval, unions collaborated to cement a mutually beneficial deal. The Carpenters, Electricians, Ironworkers, Laborers, and Operating Engineers unions developed a 'five craft' agreement setting out their jurisdictions on solar work, which after 2014 was adopted on a majority of projects across the state.

By unionizing most large solar construction jobs, unions strengthened their own leverage. Prior union construction in rural parts of the state was heavily focused on public infrastructure like highways or hospitals, which often hired workers for only a few weeks before layoffs. In contrast, according to one Ironworker, 'The best part [of solar] is it's steady. You get 40 hours every week, scheduled out for months.' With firm demand reinforcing their leverage, building trade unions in the booming solar areas have made contract gains – including, in the case of many California Ironworkers, excising their low-paid 'helper' tier from their contract altogether, replaced with union apprentices.

With stable solar work lined up, many California construction unions expanded their membership. More changed than bare numbers: in union locals that were majority white a decade ago, union records and leaders now boast of the newfound inclusion of Latinx, young, or formerly incarcerated workers – often becoming majority Latinx in membership and leadership alike. With steadier solar work, greater union dues, and multiracial solidarity, construction unions expanded their associational power.

Growing union inclusion and resources strengthened building trade influence on state and local officials, particularly in regions where they grew fastest with solar jobs. From 2018 to 2020, the Fresno regional Labor Council won 16 of its 22 electoral races challenging municipal incumbents.

The political gains helped shift policy not simply for labor, but also for its broader immigrant and environmental justice coalition to redistribute urban infrastructure and parks towards long-neglected neighborhoods with majority working-class people of color. New Latinx majorities in building trades, often from those barrios, canvassed and shifted their unions to support a coalition agenda that benefited them at work and home alike. In 2021, the Fresno City Council adopted a citywide requirement for labor at union standards on municipal construction, reversing a longstanding local ban on such a mandate. That set up further union growth, based on redistributed infrastructure.

For all these gains through challenges in the state, California construction union leaders were careful to avoid workplace confrontation with employers, in solar or beyond. Strikes and other solar workplace stoppages were unheard of, according to union members interviewed, based on leaders' strategy to pitch union labor as reliable to contractors and state officials alike. Union leaders sought agreements with solar employers that committed to build those projects even while the rest of the local union went on strike.

Union leaders' hesitation to challenge employers might not only limit their bargaining power but also constrain them to follow the direction of private capital investment. In the Bakersfield area, solar jobs grew nearly as fast as anywhere in the state, but construction unions continued public lobbying alongside employers for expanded oil drilling. This experience shows how a clean energy boom alone is not a sufficient condition to turn unions into unequivocal leaders of a climate transition. Despite that limit, California's solar transition demonstrates how worker power can advance an industrial transformation, build potent new alliances, and expand union leverage for fights to come.

Manufacturing: electric vehicles

Mandates and subsidies for electric vehicles (EVs) have become dominant public approaches for a transportation transition in the United States. President Biden issued a mandate in 2023 for a majority of new car sales to be electric in a decade, while California Governor Newsom, during 2020's disastrous wildfires, mandated new passenger vehicle sales would achieve 100% zero emissions by 2035. EV sales grew to 11% of all new cars by mid-2021 in California, when the state accounted for 39% of all US sales of EVs to date (Szczesny 2021). However, as union leaders warily observed (UAW 2019), until 2022, federal and California legislators established no new labor standards or union support while propping up the EV sector.[2]

California is a hub of the EV transition, with two EV manufacturing plants and a smaller factory under construction, along with EV management and logistics centers in Silicon Valley and the Los Angeles region (Bui et al.

2021). None of this manufacturing work has been unionized, though unionized workers held some temporary construction and service positions. Little research to date has assessed the shifting power of workers in the EV transition, although it has documented harsh consequences of EV-related mining for ecosystems and Indigenous societies (Riofrancos *et al.* 2023). Our case focuses on manufacturing workers, potentially able to transition from gas vehicles to EV roles in the shift.

For autoworker activists we interviewed, the EV transition's key condition is its arrival during a longstanding auto company offensive against labor power and its costs. Beginning in the late 1970s, US auto executives pushed for outsourcing to non-union factories, closures of union plants, and at remaining union factories, imposed labor cuts with automation and 'lean' production (Parker and Slaughter 1988).

California exemplified management's offensive. From the 1980s through early 1990s, all but one of the unionized auto plants in the state were permanently shut, and the remaining General Motors plant in Fremont, near San Jose, converted to an attempted model 'lean' factory. This offensive hit hard against the principal union in the sector, the United Auto Workers (UAW). From its 1979 peak at 1.5 million members across the US and Canada, by 2021, the union was reduced to 391,000 members solely in the US, with roughly half in manufacturing. In California, less than a few hundred UAW auto distribution workers remained after the state's last plant closed in 2010.

Autoworker activists were often critical of how conciliatory strategies from union leaders, not only employer attacks, undermined members' leverage. On the defensive to keep unionized plants open, UAW leaders granted mounting contract concessions as part of a 'labor-management partnership' to boost corporate profitability. While early concessions focused on trimming healthcare benefits and wages, following the 2008 recession, union leaders agreed to a 'two-tier' workforce across the industry: new hires and temporary workers would now never reach the pensions, wages, or job security of prior 'legacy' workers (Cutcher-Gershenfeld *et al.* 2015).

Instead of an active state role to boost worker power, in 2019 GM bailout negotiations, 'the U.S. government pressured the UAW to agree to what it termed competitive wages' and other concessions, including establishing GM's EV pilot plant at a lower tier, paid $15 to $17 per hour (*ibid.*). These concessions have defined the electric transition since; while UAW gas powertrain workers earned more than $31 per hour as of 2021, EV workers earned $17 to $22.50 an hour, with far less benefits (Krisher and Kruesi 2021). That divide weakened the UAW's associational power, both in dues funding and member involvement.

Autoworkers' structural leverage has been limited in EV assemblies that generally demand less labor. One industry analyst estimated a decrease in

50% to 75% in workers for EV drivetrains, compared to their fossil-powered predecessors (Krisher 2019). Gas powertrain workers were anxious that their experience often counted little for the chemistry and software skills employers sought for EV production. As of 2021, a majority of EVs, batteries, and components were slated to be built outside of the United States – and even largely unionized Ford pledged to resist unionization of its major new EV plants (Howard 2021). To cut labor leverage and costs, a GM executive extolled EVs as simply 'a better way to run the business' (Grzelewski 2020).

Compared to hostile employers and passive lawmakers, union leaders have been only slightly more active in building worker power in the EV transition. California's largest auto factory, by far, is the Fremont Tesla plant, near San Jose, with over 10,000 production workers in the shell of the former GM 'lean production' model factory. A 2016–2019 UAW union campaign at the plant faced fierce opposition from Tesla management, including illegal firings of union supporters (Minchin 2021). Limited shopfloor organization, fears of retaliation, and a 2019 withdrawal of UAW organizing staff prevented Tesla workers from unionizing to date.

Top UAW leaders pledged union organizing drives at US EV startups like Rivian and Lordstown Motors, in contrast to local government officials, who have staunchly committed to keeping costs and regulation low for these fledgling employers (O'Kane 2021). Without stronger EV worker organization, union political influence or coalitions with social movements in the EV transition have been elusive. Yet UAW leaders remained focused on legislative means in their strategy to build power, as in a 2022 convention resolution on EV transition strategy that hinged on winning union-friendly tax incentives to entice employers. With private negotiations, UAW leaders won a union agreement at some GM EV facilities announced in 2021, but not at major new Ford EV and battery plants (Krisher 2021, Howard 2021).

Rank-and-file UAW members frequently understood the current EV transition as bearing epic risks to their jobs and union power. Unite All Workers for Democracy (UAWD), the national reform caucus of UAW members, held events and publishing articles calling for new organizing of EV plants to be longer-term, better funded, and more community-rooted, as well as a more confrontational, strike-ready approach to contract bargaining with auto companies (Mayhugh 2021). In contrast, Brian Keller, a prominent conservative UAW member blogger and dissident candidate, called for hostility to the EV transition in general. Candidates supported by UAWD won majority control in the union's first direct leadership elections in early 2023. New president Shawn Fain pledged an aggressive campaign to unionize EV factories, but its success would require deep shifts across the union, including major organizing advances by autoworkers themselves.

The EV manufacturing transition overall shows the dangers of industrial transitions with minimal state and union action to support

worker power. State EV support, devoid of labor standards, was an opportunity for auto companies to intensify their long campaign against labor power and its costs. After their earlier decimation, few organized autoworkers remained in California to organize EV factories or push for labor standards in state EV policy. Without a major shift, the EV transition is poised to justify fears of dire union job losses brewing among autoworkers. A dearth of both public and union initiative hobbled worker power to drive a transportation transition past auto companies' designs.

Electricity: Diablo Canyon Nuclear Plant

To observers of energy policy, the fate of Diablo Canyon Nuclear Power Plant (DCNPP) has been in disorienting upheaval. In 2016, Pacific Gas and Electric (PG&E) announced the planned closure by 2025 of this major nuclear plant on California's Central Coast, the last one in the state. The Diablo retirement plan was the result of an unlikely coalition involving the utility, the International Brotherhood of Electrical Workers (IBEW) Local 1245 (representing the majority of PG&E's workforce), the Coalition of California Utility Employees (CCUE)[3], Natural Resources Defense Council, Friends of the Earth, and the local community and ratepayer advocacy group Alliance for Nuclear Responsibility.

While the deal was hailed by researchers and parties to the agreement – including union staff we interviewed – as a model for 'just transitions' in the energy sector (McKinzie 2016), at the time of writing, that deal and its coalition seem to be breaking apart. In March 2023, after a series of reversals by state political leaders and the utility, the Nuclear Regulatory Commission approved PG&E's request to continue operating the plant at least until 2030. In April 2023, Friends of the Earth sued PG&E over the reversal of the 2016 agreement, naming IBEW 1245 and CUE as defendants – a move that signals a complete breakdown of the coalition behind the 2016 agreement. How then do we explain the reversal of what appeared to be a just transition success story?

The negotiated process to close DCNPP came in 2016, in response to rising operating costs and simultaneous pressure to meet California's requirements for renewable generation. Based on the testimony of parties to the 2016 agreement, the coalition behind the Joint Proposal was instigated by PG&E, based on the utility's desire to ensure a timeline that would be desirable for the utility. The labor and environmental groups behind the agreement each negotiated independently with the utility based on their areas of interest in the agreement. And while they advocated together for the funding of the Joint Proposal before the state legislature, they did not share a deep alignment of interests regarding the future of the plant. This

ultimately made the coalition vulnerable to changing political and economic circumstances that changed the union's strategy.

Since its inception in the 1970s, environmental and community organizations had opposed the plant based on alleged risks of earthquake, attack, and accidents (Wills 2006). Environmental groups also sought tougher state regulations on the plant's cooling process, which discharges heated water, kills fish, and transforms the local marine environment (Fleischli and Hayat 2014). These efforts, over time, increased regulatory compliance costs for the plant. In 2016, PG&E's lease to operate Diablo's cooling facilities with the State Lands Commission neared expiration, and state regulators were unlikely to renew it without mitigation estimated to cost billions of dollars.

In the meantime, increasing mandates for renewable generation under the state's RPS legislation proved challenging for a nuclear plant like DCNPP, unable to rapidly adjust in response to fluctuating solar and wind supply. The proliferation of localized electricity retailers across the state, enabled by 2002 legislation, led PG&E to anticipate a 30% reduction in its consumer base. In 2016, analyses by the utility and Friends of the Earth led to the same conclusion: DCNPP was inhibiting, rather than supporting, the state's decarbonization goals due to the difficulties of integrating the plant into a renewables-based grid.

Under these conditions, Friends of the Earth contacted PG&E to negotiate a deal that would extend the plant's life a few years beyond the expiration of the coastal lease, seeking a planned transition that would avoid a ramp-up of natural gas to replace the plant's output. PG&E similarly wanted to continue to operate the plant through the end of its licensing period, without installing the mandated cooling towers. Due to the associational, political, and structural power of IBEW 1245, PG&E knew that it needed the union's support to convince the State Lands Commission to extend its lease beyond the current expiration date of 2017. As a former union leader described, 'That's the result of an extraordinary fact that we had and have more political power than the largest utility in California, because we have consciously developed a cadre of organizers, organizing stewards, in our membership.' Associational power, developed through organizing stewards, translated into political influence through capacity for member lobbying, donations, and volunteering.

IBEW 1245 was not in favor of the plant's closure, but at the time that closure seemed to be a foregone conclusion. A past experience with the abrupt closure of the San Onofre Nuclear Generating Station – where workers, in the words of one union leader, 'just got wiped out' – had demonstrated the risk of not engaging. However, even in a situation of certain job loss, the union had structural leverage: employees with required certifications from the Nuclear Regulatory Commission are highly skilled and mobile, and might readily find employment at other facilities. PG&E was particularly concerned with retaining a sufficient

workforce up to the date of closure, in order to meet the standards for safe operation of the plant. Moreover, its leadership took a generally forward-looking stance with regard to changes in the energy system and was active in policy processes shaping renewable energy legislation. Thus, securing beneficial terms of closure was more important, and more feasible, than fighting the closure itself.

Wary of the associational power of IBEW 1245, PG&E approached the union with a deal that it felt was generous enough to win broad support, based on past experiences of members voting down unfavorable terms. The resulting agreement included 25% retention bonuses[4], additional retirement benefits, as well as reemployment options for younger workers, principally in the decommissioning process – which would normally be contracted out at a lesser cost.

The Diablo Canyon case offers lessons on how long-term efforts by labor and environmental groups, acting independently to build influence in state politics, can create conditions for just transition coalitions to emerge. However, it also demonstrates the fragility of these coalitions when they are not based on a deep alignment of interests or forged by the initiative of labor and community organizations.

DCNPP's shift in fortune came in response to new federal funding promised to buttress faltering nuclear plants, delays in PG&E's procurement of new renewable sources to replace Diablo, renewed support by nuclear energy proponents (Aborn *et al.* 2021), as well as fears on the part of state elected leadership that grid volatility may pose a threat to their political fortunes (Von Kaenel 2022). In this context, former Diablo opponents Gov. Gavin Newsom and Senator Dianne Feinstein both reversed course and voiced support for the plant (Feinstein 2022, Newsom 2022). PG&E subsequently requested that the NRC extends its operating license to 2030 (Walton 2022). While some members of the coalition behind the 2016 agreement, like Friends of the Earth, have contested this change of course, IBEW 1245 has rallied behind the renewed push to extend Diablo's life (Dean 2022).

At the time of writing, the fate of Diablo Canyon remains uncertain. What is clear is that an initially promising coalition, brought together by the employer, ultimately lacked independent bonds and political direction from labor and community groups. IBEW 1245's participation was pivotal due to its firm associational power but only secures so long as the plant's closure seemed inevitable. Interviewees from environmental and labor organizations involved in the Diablo deal reported their groups had initially worked together on other transitions, including phasing out natural gas in residential construction, but these projects were in limbo now that state leadership was offering renewed support for the plant. A reactive union position, closely linked to their employer's direction, fractured labor-environmental alliances once hailed as breakthroughs.

Analysis

Our three cases on crossroad industries show that associational power and coalition-building, when used to challenge employers and state actors on the terms of transitions, enabled unions to take a proactive stance toward change in transition and to expand worker power in the process. This was essentially the path of California solar construction, where growing union strength supported ambitious clean energy goals and social alliances. In contrast, long-term erosion of associational power for autoworkers weakened the union's ability to shape the terms of transition, thereby producing a split among progressive and conservative stances to change.[5] Among nuclear workers, an employer-led coalition easily broke down when political conditions shifted in favor of a status quo trajectory. These cases demonstrate how union transition strategies are built on their assessments of their leverage, risks, and potential allies, toward the goal of strengthening collective power (Kalt 2022). Below, following each research question, we highlight common strides and shortfalls of worker organizing that shaped climate transitions in California.

What conditions shaped union transition strategies?

Building on Kalt's (2022) typology of conditions for union transition strategy, we found that 'external' factors of socio-economic context – in particular, 'structural' labor demand for already-unionized types of workers – formed a crucial condition for labor leverage in transitioning sectors. With solar construction, strong demand for skilled ironworkers, electricians, and other tradespeople in remote sites granted local unions a conspicuous opportunity to leverage their capacities of workforce training, hiring, and dispatch. Recognizing that 'sunrise' opportunity, construction unions took an affirmative strategy that supported expanding California's renewable mandates, towards 100% emission-free energy by 2045.

For other sectors, structural leverage hinged on narrower factors. In nuclear, the employer's need to retain highly skilled employees with NRC licenses gave workers structural leverage to secure rich retention bonuses and reemployment options when faced with seemingly certain job loss. Utility workers, in general, faced growth or maintenance of job levels with a renewable transition, easing their unions' initial support for that switch. For EV manufacturing, despite prospects of job growth in California, unionized autoworkers had been decimated through past shutdowns, which deeply sapped unions' associational power to organize the 'sunrise'. Without the leverage of labor demand in a coming transition, unions tended towards reactive and oppositional strategies.

Governance context also played a crucial role, through regulations that structured the labor market, like California's in-state renewable generation requirements, or its disputable environmental permitting. For solar construction and nuclear plant workers, these laws helped bound industrial transitions to favorable turf for labor. Conversely, a lack of any geographic structuring or other labor-supporting regulation in EV manufacturing challenged union attempts to gain a foothold in California.

In terms of conditions of 'internal structure', we found that strong rank and file involvement and union democracy were crucial to labor's associational leverage in transitions. Solar union members were pivotal in the peer-to-peer skills training and political canvassing that underlaid collective power. Growing Latino inclusion and cross-racial solidarity in the union formed internal bulwarks for leverage at work and in politics. An active, wide-reaching steward network formed the backbone of nuclear utility workers' heft with the state and employer alike. For autoworkers, a rank and file reform movement winning open elections was key to launching an electric transition strategy that overcame reactive union elements. In our cases, strong labor-community coalitions were more often an outcome of union transition strategy, rather than its pre-existing condition.

How did workers build and exercise collective power to enact transition strategies?

In our California cases, union strategies broadly aimed to increase union representation and build worker power in transitioning sectors. To achieve those goals, instead of confronting employers directly with workplace action, unions relied largely on leveraging regulation. However, a crucial distinction came from the degree to which the transition aims of unions and their coalition partners were developed independently, towards challenges to employers' goals.

These California transitions demonstrate an under-appreciated way that unions leveraged environmental regulations, distinct from the regulatory tactics of environmental organizations to block development in conflict with both labor and management. In our construction and electricity sector cases, unions wielded existing regulations and actively shaped new ones to secure new work.

In a key solar boom region around Fresno, organized solar construction workers pushed for renewable mandates to ensure in-state construction, then waged threats to developers' environmental permits to apply pressure to unionize projects. In the initial agreement to retire the Diablo Canyon nuclear plant, the union was invited into a coalition initiated by their employer because their influence with key state regulators was necessary to win support for the shutdown plan. In EV manufacturing, until this year, the

key union sought legislative subsidies that would entice employers towards unionization and relied on legal pressure as the main defense of its organizing drive in a hostile non-union plant.

Union transition strategies fundamentally diverged when they were planned in collaboration with management, versus as independent challenge. Construction unions' affirmative strategy to support and unionize solar construction was planned and waged through their own cross-trade coalition, apart from and often in conflict with solar power plant developers seeking lower costs. Nuclear power workers joined an employer-led coalition with environmental groups to set terms for their plant's closure but did not build independent labor-environmental relationships or strategies. When continued plant operation later became clearly possible, unions turned toward the employer and away from other allies to keep the plant running. Leaders of the key union in EV manufacturing initially lobbied alongside their employers for subsidies to boost their plants. The victory of a reformer slate at top levels led to a strategic shift to challenge employers with independent political lobbying and possible strikes to unionize plants, raise standards, and end divisive tiers while supporting an EV transition overall. Overall, an 'affirmative' union strategy for climate transitions was supported by workers' independence, rather than labor-management partnerships.

What were the outcomes of union transition strategies for worker power?

An affirmative strategy that challenged employers helped build a virtuous cycle of worker empowerment in solar construction. In a California region long hostile to worker organizing, a solar boom helped construction unions' structural leverage, wielded through their 'fix' for workforce reproduction. From their swelling ranks and resources, these unions were then able not only to boost their wages and benefits but also to build coalitions with immigrant and environmental activists, transform municipal electoral politics, redistribute public infrastructure funding more equitably, and win policy shifts to expand future unionization.

In the nuclear plant, a more reactive transition strategy, aligned with management's goals, led to a reversal that undermined fragile union relationships with environmental and community organizations. Those relationships, according to both union and environmental group interviewees, had held promise for guiding future transitions. The reversal drew into question the viability of future transition coalitions among these partners. In EV manufacturing, the key union's longstanding strategy of labor-management partnership had done little to prevent a collapse of worker power. That record inspired a member rebellion that shifted this year to a more affirmative and confrontational strategy, with outcomes too soon to tell.

In short, where unions had the initiative and power to take decisive leadership, they built worker power in industrial transitions; where unions did not, new or changing industries grew with little empowerment for the workers building them.

Conclusion

For those seeking swift and just climate action – including workers themselves – building unions that lead fighting coalitions will likely be essential to break the fossil fuel industry's grip on Earth's future. When they led and embraced transitions on their terms, California unions not only grew their own power but became potent movement partners advancing climate action with broader social gains. In contrast, when unions took a reactive or defensive transition strategy, taking direction from employers, they hindered or offered no help to movements struggling for transitions away from fossil energy. To drive climate action, unions held a distinct swing position between potential coalitions, and often offered a pivotal force to set the fate of transition decisions.

Those stakes are why workers' collective power, and not just their individual incomes, must be a measure of just transitions. In the three California climate transitions we studied, when workers were actively organized to build power, they were not simply recipients of policy benefits or a voice at a table, but a decisive force shaping the transition.

California's political-economic landscape was a constant in our analysis, but our findings are relevant elsewhere. Our cases show how unions facing the sunset of one industry and the rise of another can steer transitions by leveraging their abilities to provide the new workforce needed, backed up by inclusive, democratic member action and independence from employers.

Our California cases demonstrate the potential for environmental, community, and worker organizations to collaboratively wield regulation as a tool for building joint power. Union leverage of environmental regulations, along with coalition wins, shows routes past entrenched 'jobs vs. environment' narratives. Where law doesn't yet provide for that kind of leverage, a labor and environmental alliance could find common interest in winning it. For instance, labor-environmental coalitions could shape better EV policy, advocating for broader investments in public transit – benefiting other unionized sectors – while strengthening worker power along supply chains from the lithium mine to battery recycling (Dominish *et al*. 2021, Riofrancos *et al*. 2023). These more progressive conditions may in turn support more progressive union strategies (Kalt 2022).

Future research can help forge more rapid, just transitions by supporting unions and movement partners to find transition trajectories that align their interests, independent from employers. Given the limited workplace actions

by unions in our cases, new research could also fruitfully assess the conditions and consequences of strategies involving strikes, slowdowns, and other direct jobsite tactics in climate transitions. A research agenda that matches the urgency of the climate crisis would be one that supports transforming union strategy from within, girded by mutual learning between laborers and environmental movements, towards their common power.

Notes

1. In a review of the following solar energy-related legislation, no references to union, labor, or wage standards were found, except for noted outliers. SB-100 California Renewables Portfolio Standard Program (2018); SB-1078 Renewable energy: California Renewables Portfolio Standard Program (2002). US HR 1 American Recovery & Reinvestment Act (2009) implemented a prevailing wage requirement for its temporary loan guarantees to renewable developers and manufacturers.
2. EV legislation reviewed: SB-129 Budget Act of 2021 (2021). SB-551 California Zero-Emission Vehicle Authority (2022). SB-1014 California Clean Miles Standard and Incentive Program: zero-emission vehicles (2018). AB-615 Air Quality Improvement Program: Clean Vehicle Rebate Project (2017), HR 8 American Taxpayer Relief Act of 2012
3. CCUE is a coalition of unions, including IBEW 1245, representing approximately 43,000 utility employees
4. The agreement included retention bonuses equalling 25% of the employee's base salary are paid annually for up to 7 years (PG&E 2016, Ch. 7 p. 4).
5. We use progressive and conservative to signal stances that embrace change vs. those that protect the status quo. These are not necessarily aligned with partisan politics associated with these terms

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Ethics declaration

This research received ethics approval from the University of California, Berkeley Committee for the Protection of Human Subjects (Protocol ID 2022-06-15,404) and

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