Pitzer College

Elevating Equity: Strategies from State-Level Clean Energy Standards in the United States

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List of Abbreviations

Abbreviation	Full description
AB	Assembly Bill
CAC	Climate Action Council
CCPA	Climate and Community Protection Act
CCS	Carbon capture and sequestration
CEC	California Energy Commission
CEJA	California Environmental Justice Alliance
CES	Clean energy standard
CETA	Clean Energy Transformation Act
CLCPA	Climate Leadership and Community Protection Act
CPUC	California Public Utilities Commission
EEFA	Energy Efficiency for All
EIA	United States Energy Information Administration
ESA	Energy Savings Assistance
ETP	Energy Transformation Project
FERA	Family Electric Rate Assistance Program
GDP	Gross domestic product
GHG	Greenhouse gas
GW	Gigawatt
GWh	Gigawatt-hour
IOU	Investor-owned utility
IZA	Institute for Labor Economics
kW	Kilowatt
kWh	Kilowatt-hour
LBNL	Lawrence Berkeley National Laboratory
LCOE	Levelized Cost of Energy
MW	Megawatt
MWh	Megawatt-hour
NREL	National Renewable Energy Laboratory
NYSERDA	New York State Energy Research and Development Authority
PM	Particulate matter
PNM	Public Service Company of New Mexico
PUSH	People United for Sustainable Housing
PV	Photovoltaic
SB	Senate Bill
SEIU	Service Employees International Union
SJGS	San Juan Generating Station
SOMAH	Solar on Multifamily Affordable Housing
tCO_2e	Metric tons carbon dioxide equivalent
UTC	Washington Utilities and Transportation Commission

I. Introduction

According to the Intergovernmental Panel on Climate Change, the world needs to reach net-zero carbon emissions by 2050 in order to limit warming to 1.5°C and avoid the most catastrophic impacts of climate change (Millar et al. 2017). For the electricity sector in the United States, that means replacing 63% of annual electricity generation, a staggering 2,580 billion kWh, with non-emitting alternatives in the next three decades (EIA 2020b). A transformation of this magnitude will undoubtedly require drastic policy intervention. While federal climate policy in the U.S. remains stagnant, progressive states have begun to chart their own paths to a clean energy future. These states are beginning to confront the fundamental challenges of remaking the U.S. energy system, most importantly, who will reap the benefits and who will bear the costs. As more states and perhaps the federal government look to act on climate, lessons from early adopters will prove invaluable for designing clean energy policies that distribute the impacts of the energy transition equitably.

Without specific strategies for equity, the transition to clean energy threatens to disproportionately disadvantage America's most vulnerable communities. Poor communities are particularly susceptible to energy price shocks and reliability issues. Nearly a third of all U.S. households and half of Latinx and Black households already struggle to pay energy bills (EIA 2015). Many of these households forgo food and medicine to heat and light their homes. Additionally, fossil fuel production has formed an essential part of the American economy for over 100 years. Communities across the U.S., from Appalachia to the Navajo Nation, depend on the fossil fuel industry for their economic wellbeing. Transitioning to clean energy represents a serious risk to vulnerable communities but also a massive opportunity. Renewable electricity can offer energy security and independence for low-income households and revitalize neglected

fossil fuel-dependent communities with new investment. The U.S. needs to prioritize equity, not just urgency, in the transition to a clean energy economy to actualize these opportunities for social justice.

The state-level clean energy policy environment is rapidly evolving with vastly different approaches to equity. States have overwhelmingly turned to portfolio mandates, known as clean energy standards (CESs)[1], to meet the challenge of transforming the electricity sector. CESs require retail electricity suppliers to supply a minimum percentage of their retail load with eligible sources of clean energy. While CESs have been in use since the 1980s, a new wave of 100% CESs signal their emergence as the predominant policy mechanism for decarbonizing the electricity sector. Whereas the marginal targets of previous CESs encouraged early technology development, the net-zero commitment of 100% CESs requires a fundamental transformation of the electricity industry.

The impacts of these mandates, from higher consumer electricity bills, to displaced workers, to new economic opportunities in clean energy, will not be felt evenly across society. Recognizing this reality, early states have adopted strategies to mitigate the adverse impacts of these policies and redistribute their benefits. Already there exists significant divergence both in who these strategies are intended to protect and what policy mechanisms they utilize. These differences are due in part to the fact that the transition to clean energy will impact each state differently but also to differing social and political climates. States considering 100% CESs should learn from these early adopters while tailoring policies to their individual needs.

To that end, this paper compares states' approaches to equity in 100% CESs. I

[1] This policy mechanism is also often referred to as a renewable portfolio standard. For the purpose of this paper these two terms are equivalent.

avoid adopting an explicit definition of equity because I do not attempt to evaluate the impacts of these policies. Rather, I analyze how different states are forging their own definitions of equity within their clean energy policy. Specifically, I present case studies of four early adopters that have championed equity in their clean energy transition. First, New Mexico offers a unique strategy for protecting displaced fossil fuel workers through power plant securitization. Next, California's robust policy context demonstrates how to minimize the financial impact of clean energy to ratepayers. Finally, New York and Washington each use dramatically different mechanisms to integrate reparational equity into the core of their clean energy policy. While it is still too early to quantitatively analyze the distributional impact of these policies, this case study approach provides useful insights into which constituencies states are prioritizing in the transition to clean energy and what strategies states are using to achieve equitable outcomes. Furthermore, these case studies reveal notable differences in states' interpretations of equity in the context clean energy. I find that these differences reflect states' needs to balance their cultural and political values with economic realities.

This paper proceeds with an overview of the U.S. clean energy policy context and a review of relevant literature on the distributional impacts of CESs. The next section presents four case studies. The final section compares key components across case studies and discusses the role of CESs in the broader context of clean energy equity.

II. U.S. Clean Energy Policy Context

Clean energy policy has traditionally prioritized efficacy and efficiency over equity due to the urgency of the threat posed by climate change. As renewable generation technology developed in the 90s, policymakers aimed to build out as much capacity as possible, paying

exorbitantly high costs relative to other sources of energy (Mormann 2019). Slowly, as the market matured, cost effectiveness rose as an important policy consideration, leading to the introduction of competitive auctions and other market-based policies. These policies have served to mitigate the cost to ratepayers burdened by the economic inefficiency of early renewable energy policy. Only recently has distributional equity risen as a principal concern of policymakers.

U.S. state-level CESs have followed the same trajectory. Since Iowa enacted the first CES in 1983, CESs have grown to incorporate market-based mechanisms, cost caps, and policy interventions for distributional equity. Over this period, CESs have expanded to cover 29 states, the District of Columbia, and Puerto Rico, applying to 56% of the total U.S. electricity market (Barbose 2019). While the design of CESs varies from state to state, they all follow the same general structure. Producers receive tradable credits for each MWh of clean electricity generation. Retail electricity suppliers must either earn enough credits to cover the specified percentage of their retail load or purchase credits on the open market. This structure enables states to set specific targets for the share of clean energy in their electricity mix and producers to achieve them in a technology-neutral and cost-effective manner. Key differences across states include the amount of clean energy mandated and the timeline for its attainment, the eligible sources, and the penalties for non-compliance. From 2015 to 2020, eight states, the District of Columbia, and Puerto Rico enacted 100% CESs with the timeline for decarbonization ranging from 2032 to 2050. This new wave solidified CESs role as the dominant state-level policy mechanism to guide the transition to clean energy.

States have utilized CESs despite disadvantages in cost effectiveness and economic efficiency relative to other policy mechanisms for mitigating climate change. The economics

literature has extensively highlighted the advantages of pricing carbon through a carbon tax or cap-and-trade system compared to mandates such as CESs. In theory, pricing carbon is a more cost-effective way to reduce greenhouse gas (GHG) emissions because it leads to equalized marginal abatement costs across polluters. Whereas CESs indirectly reduce GHG emissions by promoting clean energy, carbon taxes and cap-and-trade put a price directly on GHG emissions. In this way, carbon pricing allows firms to leverage a wider variety of abatement mechanisms that may not qualify under a CES such as replacing coal with cleaner-burning natural gas. As long as they include a market for credits or allowances, both mechanisms are cost effective. The difference is that CESs build clean electricity generation at least cost while carbon pricing abates GHG emissions at least cost.

Similarly, carbon pricing is widely regarded as more economically efficient than CESs. Climate policies are economically efficient if and only if they result in the level of abatement where the marginal cost to abate one ton of carbon equals the marginal benefit of abating one ton. A free market does not achieve an efficient outcome because it does not capture the societal benefit of abating GHG emissions. Imposing a carbon tax equal to the social cost of carbon accurately values the benefit of abatement and leads to an efficient outcome. Alternatively, setting the cap on emissions in a cap-and-trade system to the efficient level of pollution accomplishes the same thing. Due to CESs' focus on clean energy production rather than the externality of GHG emissions, they are less likely to reach the efficient level of GHG emissions.

Distributional equity has recently emerged as an additional essential metric for comparative policy analysis in clean energy. From an economic perspective, equity is the measure of how the net cost of a particular policy intervention is distributed across society. A policy is considered regressive if the net cost, as a proportion of income, is higher for those less

able to pay while progressive policies impose a lower ratio of cost to income on these individuals. Progressive policies encourage universal access, consistent with the idea of energy as a basic necessity (Mormann 2019). Thus, the distribution of net costs is a crucial metric for comparing clean energy policies.

A 2019 special issue of the Journal of the Association of Environmental and Resource Economics explores the distributional equity of various clean energy policy mechanisms. In the introduction, Deryugina et al. (2019) attribute the preference for mandates such as CESs to the perceived adverse distributional impacts of carbon taxes. The rest of the issue presents empirical evidence suggesting that policymakers' perceptions are unfounded and that in truth, carbon taxes are less regressive than their alternatives. The issue establishes on a broad level that technology mandates including those on energy efficiency, fuel economy, and clean electricity are more regressive policy tools than carbon taxes (Levinson 2019, Davis and Knittel 2019, Bruegge et al. 2019, Fischer and Pizer 2019, Reguant 2019). While both mechanisms impose high proportional costs on low-income consumers, carbon taxes have the distinct advantage of generating revenue that can be redistributed to offset costs. Furthermore, carbon taxes are more cost effective, imposing lower total costs to consumers. Importantly, Reguant (2019) points out that the distributional impacts of clean electricity policies largely depend on how costs are passed on to ratepayers through electricity bills.

Despite these disadvantages, policymakers have favored CESs because they are more politically feasible. Relative to other regulations, CESs represent only a marginal expansion of regulatory authority. For decades, states have designed mechanisms to regulate sources of electricity to address reliability and other concerns. CESs can be seen as a response to public demand for reliable, inexpensive, and environmentally friendly electricity. Furthermore,

mandates simply do not carry the same negative political connotations as taxes. The costs of CESs are obscured to a higher degree than those associated with carbon taxes or cap-and-trade. Overall, clean energy standards offer a politically palatable alternative to pricing carbon. Given the urgency of climate change, political feasibility is arguably the most important consideration for climate policy. Goulder (2020) suggests that if the probability of near-term implementation is included in cost-benefit analysis, then CESs may even emerge as less costly overall than carbon pricing.

Importantly, CESs and carbon pricing are not necessarily mutually exclusive. Political limitations have forced policymakers to choose between these two mechanisms and pitted CESs against carbon pricing in the literature. In reality, carbon pricing and CESs can complement each other by simultaneously raising the cost of fossil fuel generation and mandating clean technology development. Currently, several progressive states including California and New York have both 100% CESs and cap-and-trade in place. As other states start to take more aggressive action on climate, this tradeoff may erode. For example, in April 2020 Virginia enacted a 100% CES and joined the Regional Greenhouse Gas Initiative in the same bill. Ideally, down the line combined 100% CESs and carbon pricing will be commonplace. However, many states lack the political will for such aggressive climate policy. For these states, CESs will likely continue to dominate clean energy policy. Given this reality, the distributional impacts of CESs are most relevant for clean energy equity in the United States. The next section explores these impacts and potential policy solutions.

III. Distributional Impacts of Clean Energy Standards

The primary impacts of CESs can be grouped into three major categories: increased cost of electricity, workforce disruption, and environmental benefits. Each of these impacts is not distributed equally across society. The first two offer ample reason and opportunity for policy intervention to redistribute their net costs. Targeted cost softening strategies can mitigate the disproportionate burden of high electricity prices on low-income ratepayers. Secondly, workforce retraining and deliberate location of replacement resources can ensure that new economic opportunities in clean energy are available to displaced fossil fuel workers and their communities. On the other hand, CESs' environmental benefits in the form of reduced local air pollution and the mitigation of climate change are difficult to redistribute and already primarily benefit disadvantaged communities. Policymakers have little ability or desire to intervene in the distribution of environmental benefits. For this reason, commitments to equity in CESs have primarily focused on redistributing the net costs of electricity rate increases and workforce disruption.

CESs likely increase retail electricity rates through a number of distinct mechanisms. Primarily, CESs require utilities to purchase electricity from sources that may be more expensive than fossil fuel alternatives. While the cost of renewables has shown a steep decline, they still have not reached cost parity with natural gas across the board. Current estimates put the Levelized Cost of Electricity (LCOE) of solar photovoltaics between $36/MWh and $46/MWh and the LCOE of onshore wind between $29/MWh and $56/MWh (Lazard 2019). The LCOE of natural gas combined cycle ranges from $41/MWh to $74/MWh (Lazard 2019). Proponents of CESs argue that the mandates will encourage investment in renewable energy technology and continue to drive down costs. With many policies stretching as far as 30 years into the future, it is more than likely that renewables will gain a clear cost advantage over the course of the

policy's implementation. However, even if solar and wind have a clear cost advantage on an LCOE basis, they are not necessarily the cheaper option overall because they are not direct substitutes for dispatchable electricity. Unlike natural gas-fired power plants, solar and wind cannot be turned on whenever the grid needs electricity. The bottom line is that CESs restrict utilities' ability to choose the lowest-cost option when contracting new generation. In many cases, CES-eligible technologies are the lowest-cost option. However, if they are not, the CES forces the utility to pay above market price, leading to higher prices for consumers.

Empirical studies have found that CESs in the U.S. have led to higher electricity rates, but significant disagreement remains on the magnitude of this effect. A controversial study by the University of Chicago's Energy Policy Institute found that in the 29 states with CESs, consumers paid $125.2 billion more for electricity than they would have without these policies in place (Greenstone and Nath 2019). Furthermore, they calculated that CESs led to an increase in average retail electricity prices of 11% over the first seven years of the policy. While the study acknowledges that CESs were successful in reducing GHG emissions, the estimated cost of abatement ranged from $130/tCO2e to as much as $460/tCO2e. This cost exceeds almost all calculations for the social cost of carbon (The Obama Administration's best estimate was $50/tCO2e in 2019 dollars). On the other hand, Lawrence Berkeley National Lab (LBNL) and the National Renewable Energy Laboratory (NREL) found that CESs have had a minimal impact on retail electricity prices. Their study estimated a retail price increase of less than 1% (Barbose 2019). This difference can largely be attributed to differences in analytical methodology. Greenstone and Nath's (2019) approach of analyzing differences in prices between states with and without CESs has come under criticism for oversimplifying a variety of distinct policies into

a single binary treatment effect (Jenkins 2019). On the other hand, this approach could reveal underlying forces that do not appear in case by case analysis.

Greenstone and Nath (2019) point to three often overlooked mechanisms which may explain their higher cost estimates. First, increasing the share of renewable generation will likely lead to higher transmission costs. Utility-scale renewable generation takes up a lot of physical space and is generally located far from population centers. As a result, transitioning from fossil fuel infrastructure to renewable infrastructure will require significant changes to transmission infrastructure as well. While LBNL and NREL account for these costs in their estimate, they acknowledge that transmission costs are likely to increase significantly as the renewable electricity share moves above 50%. Second, the intermittent nature of renewable sources means that back-up capacity must be added. Energy storage is the primary means of managing intermittent load, but battery technology remains relatively expensive and other forms, such as pumped hydro, have not been proven on a large scale. With current low levels of renewable capacity, load management is less of an issue because fossil fuel generation can supplement periods of low renewable generation. However, as CESs move upwards of 50%, new methods of load management will be necessary. This additional infrastructure is likely to drive up operating costs for utilities. Third, aggressive mandates threaten to prematurely displace existing generation. Depending on the structure of regulation, the cost of these stranded assets may also be passed on to consumers.

While the magnitude of the increase is still up for debate, the general consensus that CESs will raise electricity rates presents a significant equity issue. In the absence of cost softening strategies, higher electricity rates disproportionately burden low-income ratepayers. According to a 2016 study by the American Council for an Energy Efficient Economy (ACEEE),

low-income households, defined as less than 80% of Area Median Income, spend an average of 7.3% of their income on energy compared to 2.3% for non-low-income households (Drehobl and Ross 2016). Therefore, policies that increase electricity prices impose a higher cost as a proportion of income on households with less ability to pay. Dynamic rate structures can alleviate this effect. Under a flat rate structure, all income groups pay the same amount per unit of electricity. For low-income households, this cost accounts for a higher proportion of income relative to high-income households. Under an increasing block tariff, high electricity users pay more per unit of electricity. Wealthier households tend to use more electricity and therefore pay proportionally more under this rate structure. As a result, when an increasing block tariff is in place, wealthier households shoulder a higher portion of the burden imposed by retail rate increases. Farrell and Lyons (2017) find empirical support for this theory in a study of Ireland's Public Service Obligation levies associated with renewable energy subsidies.

Indirect cost softening strategies can also lead to more equitable CES implementation. Energy efficiency and distributed generation reduce energy demand and thus soften the impact of increased retail rates. These measures are often associated with CESs due to the shared goal of reducing GHG emissions. However, high upfront costs can preclude low-income consumers from access to these cost softening measures. Therefore, they only lead to equitable outcomes when they are made available to low-income households through explicit policy interventions. If uniformly applied, subsidies for energy efficiency and distributed generation can have the opposite effect by reducing the burden of high-income households who are more likely to be able to afford high upfront costs.

CESs disruption of the energy workforce is a second crucial distributional impact that policymakers are attempting to address. CESs require a dramatic transition from a fossil fuel

workforce to a clean energy workforce. There is an abundance of literature analyzing the potential for this transition to create jobs. These studies have overwhelmingly found that clean energy electricity generation creates both more jobs per unit of energy and more jobs per dollar spent than fossil fuel generation. The World Bank estimates that wind and solar in the U.S. create 13.5 jobs per million dollars of spending compared to 5.2 for oil and gas (Cited in Kats 2016). This estimate includes direct jobs (e.g. onsite construction worker), indirect jobs (e.g. upstream steel manufacturer), and induced jobs (e.g. grocery store clerk that relies on the spending of direct and indirect workers), covering every domestic aspect of the supply chain. This can largely be attributed to the relative labor and capital inputs of these technologies. Fuel comprises a significant portion of the cost of fossil fuel energy whereas renewable energy is more labor intensive. Blyth et al. (2014) found the average labor intensity of renewable energy to be more than four times greater than that of fossil fuels (0.65 jobs/GWh compared to 0.14 jobs/GWh). Due to their labor intensity, even as renewables become relatively cheaper per unit of energy, they will maintain their advantage over fossil fuels in terms of jobs per dollar spent.

While there is a broad consensus on the job creation potential of clean energy, assessing the employment effects of CESs requires more detailed analysis. Wei et al. (2009) draw on 15 existing studies to construct a model of CESs' net employment effects. Where many studies estimate gross renewable job creation, Wei et al. estimate net job creation above and beyond that projected by existing policies, taking into account job displacement in the fossil fuel industry. This results in far stronger conclusions compared to traditional analysis on the overall impact of CESs. Using this methodology, Wei et al. estimate a cumulative gain of 2.5 million job-years above business as usual from 2009 to 2030 for a 30% national CES. More recently, the Institute of Labor Economics (IZA) and Centre for European Economic Research (2019) found empirical

evidence supporting Wei et al.'s prediction of net job gain. However, comparing across policies, IZA's evidence suggests that the magnitude of this gain depends on the effects of CESs on electricity rates. Blyth et al. (2014) also voice concern that short-term green job creation could be offset across the economy by long-term decreases in disposable income. Thus, the job creation benefits of CESs depend not only on their direct workforce impact but also on their financial costs. While this concern has not been analyzed in depth, it highlights the interconnection between the financial impact on consumers and the overall employment impact.

Overall the workforce disruption caused by CESs represents a net societal benefit with significant equity implications. The key concern is how the benefit of new green jobs and the displacement of traditional fossil fuel jobs will be distributed across society. There is no reason to believe that fossil fuel workers will naturally transition to clean energy jobs. Instead, it is likely that the switch to clean energy will cause a transformation in the location and necessary skills of energy jobs. First, renewable energy depends on natural factors that are spatially dispersed. Whereas fossil fuel plants can be located far away from their fuel sources, renewable generation can only be located where renewable resources are naturally available. As a result, fossil fuel plants tend to be located close to population centers for ease of transmission. On the other hand, renewable generation is typically built away from population centers where there is sufficient space and access to renewable resources. Navigating the relocation of energy jobs is necessary to ensure a just transition to clean energy.

Second, the transition from fossil fuel jobs to clean energy jobs will require significant changes in occupational skill needs. Meeting targets set by CESs will require both a quantitative and qualitative change in occupational skill training. Increased demand for specific occupations does not necessarily change the skill needs of that occupation. For example, CESs are likely to

increase demand for electricians and construction workers who build transmission infrastructure. The necessary skill set for this work does not change based on the energy source, thus representing a purely quantitative change. This type of change can be thought of as restructuring, or structural shifts in employment between and within industries (Strietska-Ilina 2011). On the other side, the clean energy transition will create many entirely new occupations with novel skill sets such as solar panel and wind turbine technicians. This change is most likely to produce skilled, high-paying jobs (Muro et al. 2019). Proponents of clean energy often turn to these high-paying jobs as signs of the economic benefits of solar and wind (Sen 2017).

While there is evidence that clean energy jobs are on average higher paying and more skilled than fossil fuel jobs (Muro et al. 2019), it is important to consider the full effect of clean energy policy on the labor market not just that of new occupations. A significant but less commonly studied impact lies in the greening of existing jobs, changing the skill profiles within occupations. This could affect a variety of less-skilled jobs related to clean energy construction and maintenance from cement and steelworkers to onsite electricians. Across green restructuring, new occupations, and the greening of existing jobs, CESs represent a drastic transition in the occupational skill set of energy jobs. Overall, this transition will likely be towards higher-skilled jobs, leaving unskilled fossil fuel workers especially vulnerable to displacement.

Strategies for a just transition often focus on policy interventions to protect unskilled fossil fuel workers. These can take the form of retraining, to address changes in skill needs, or relocation assistance, to address the changing geography of energy infrastructure. Other policy interventions have instead focused on low-income communities regardless of their employment in the fossil fuel industry. These include apprenticeships and job carveouts for members of low-income communities. This approach can be seen as an interconnected response to the financial

and employment impacts of CESs. In addition to addressing higher electricity prices through cost softening measures, policies can compensate disproportionately affected communities with employment opportunities.

Collectively, CESs carry a range of interconnected distributional impacts that need to be managed in order to avoid regressive outcomes. While some empirical evidence on these impacts exists, it is primarily based on early-stage CESs that face different challenges than full decarbonization. Uncertainty around the financial cost of 100% CESs makes their equity impacts difficult to predict. Despite this uncertainty, there is general agreement that CESs will raise electricity rates and create jobs. Additionally, there is evidence that many of the clean energy programs that often accompany CESs, such as energy efficiency and distributed generation, disproportionately benefit high-income households. Without significant policy intervention, the evidence points to CESs disproportionately burdening low-income ratepayers, leaving behind fossil fuel-dependent communities, and distributing the benefits of clean energy only to those that can afford high upfront costs. Among early adopters of 100% CESs, New Mexico, New York, Washington, and California have stood out for their efforts to mitigate these regressive impacts. The next section analyzes their strategies for equity, providing four detailed case studies on the implementation of 100% CESs.

IV. New Mexico's Just Transition

New Mexico made national headlines in March 2019 when it became the third state in the U.S. to pass a 100% CES. Compared to similar bills in Hawaii and California, New Mexico's SB 489 faced stronger opposition from the fossil fuel industry. The bill has been hailed as an equitable guide to the energy transition for its protection of fossil fuel-dependent communities

(McNamara 2019). On the other hand, SB 489 has drawn criticism for providing unnecessary aid to the fossil fuel industry at the expense of ratepayers and not doing enough to support the Native American communities historically disadvantaged by fossil fuel extraction. In this way, New Mexico offers a nuanced case study of the tradeoffs that come with prioritizing protections for fossil fuel workers in the energy transition.

New Mexico has rich fossil fuel resources in coal, oil, and natural gas, making it one of the top ten producers of energy among all states. New Mexico's electricity generation mix has historically been dominated by coal. Despite challenges from natural gas, as well as emerging wind and solar industries, coal-fired power plants remain the primary source of New Mexico's electricity (EIA 2020a). Beyond the electricity sector, New Mexico's economy relies on fossil fuels as its main export, accounting for nearly 1/10th of the state's GDP (New Mexico Economic Development Department 2020). In light of New Mexico's heavy reliance on fossil fuels, SB 489 represents not only a drastic transformation for the state's electricity sector but the economy as a whole. Given the potential economic disruptions, New Mexico prioritizes equity in SB 489 through protections for fossil fuels workers at risk of displacement and their communities.

The prevalence of Indigenous peoples and their ties to the fossil fuel industry adds to the complexity of establishing a CES in New Mexico. The northwest corner of the state, known as the Four Corners region, is home to the majority of the state's fossil fuel infrastructure as well as the Navajo Nation and 19 Pueblo tribes (Funes 2019). While significant concerns exist over negative health impacts (Willeto 2015), fossil fuel development provides much-needed economic opportunities for Indigenous communities. Native Americans in New Mexico have an unemployment rate of 16% compared to less than 5% for the general population (Tauli-Corpuz 2017). Additionally, the economies of two of the largest tribes in New Mexico rely on fossil fuel

extraction. Mining employs 3.6% of Jicarilla Apache tribal members and 3.4% of Navajo Nation citizens (Tauli-Corpuz 2017). As a result, SB 489 confronts difficult questions of equity not only in protecting fossil fuel workers but also in protecting the sovereignty and economic prospects of historically disadvantaged Indigenous peoples.

In addition to updating New Mexico's CES to 100% by 2050, SB 489 establishes several innovative programs intended to protect fossil fuel-dependent communities. These include authorizing utilities to issue bonds to recover their lost investments in stranded assets, mandating apprenticeships in all new construction of electricity generating facilities, and creating economic development funds for affected communities. With these provisions, SB 489 received support from a broad coalition composed of major environmental groups, labor unions, the president of the Navajo Nation, and New Mexico's largest public utility.

Winning support from this coalition was not easy. In particular, the early retirement of New Mexico's coal power plants has been highly contentious. New Mexico's two largest remaining coal power plants, located only 15 miles apart, supply over 40% of the state's electricity (EIA 2020a). These plants and their supporting mines are additionally the primary sources of economic activity in the Four Corners Region. Due to their economic significance, SB 489 directly sets the rules of their retirement. In a highly controversial move, the bill allows the operating utility, the Public Service Company of New Mexico (PNM), to share the full cost of retirement with ratepayers through securitization.

SB 489 ends a decades-long discussion over the closure of PNM's San Juan Generating Station (SJGS) and PNM's share in the jointly owned Four Corners Generating Station, setting closure deadlines of 2022 and 2031 respectively. Given its more immediate deadline, SJGS has been the primary focus of debate and will likely set precedent for the closure of Four Corners

Generating Station. PNM was forced to close half of SJGS's four units, nearly 850 megawatts, to comply with the Clean Air Act in 2017 but has continued to fight to keep the remaining two units in operation (Petersen 2017). Finally, with SB 489, PNM and the Public Regulation Commission have come to an agreement to close SJGS by 2022. Decommissioning their largest power plant is not as easy as simply shutting the doors. PNM still holds $320 million in outstanding investments at SJGS on which it expected to earn $16 million per year in profits (PNM 2017). Despite the plant closure, these debts still need to be paid. Second, retiring the plant and mine complex threatens to economically decimate surrounding communities through the loss of 450 jobs and two essential sources of tax revenue (O'Donnell 2019). Given these politically complex considerations, the New Mexico legislature established a new method of early retirement rather than allowing PNM to seek traditional cost recovery through the Public Regulation Commission.

SB 489 allows PNM to issue bonds in order to recover the cost of abandonment from ratepayers, essentially refinancing its debt through a process called securitization. Investor-owned utilities like PNM typically borrow from banks or shareholders at interest rates of seven to nine percent to invest in assets like fossil fuel plants. When these plants are retired early due to regulation or loss of economic viability, utilities are stuck with expensive debt. Securitization, however, allows utilities to substitute these high-interest loans for customer-backed debt with rates closer to three percent (Sierra Club 2018). In doing so, utilities forfeit any profit they expected to make on the asset. As a result, securitization can significantly soften the cost of stranded assets and free up capital to invest in new generation capacity.

While securitization appears to be the least-cost option for the early retirement of SJGS, SB 489 has been criticized for allowing PNM shareholders to recover the full cost of the asset. The Legislative Finance Committee estimates that securitization will cost ratepayers $27 million

per year through a non-bypassable energy transition charge. This represents significant savings for consumers compared to continuing to operate the plant or recovering the costs through traditional mechanisms, either of which would cost $45 million per year. Alternatively, it is slightly more costly than the $22.5 million per year scenario in which PNM recoups only 50% of stranded costs (Legislative Finance Committee). While most environmental groups supported SB 489, New Energy Economy (2019) strongly opposed the bill on the grounds that ratepayers should not bail out PNM's imprudent investment. In response, Conservation Voters New Mexico (2019) refuted the notion that securitization represents a bailout, pointing to PNMs loss of nearly $200 million in expected profits. In sum, securitization represents the least-cost compromise that limits the impact to ratepayers while allowing PNM to recover its stranded assets.

Securitization has also opened the door for New Mexico to assist affected communities and displaced workers. First, a percentage of all bonds is earmarked for direct transfers to displaced workers. Out of $375 million in bonds, up to $20 million go to severance and job training for employees who lose their jobs as a result of the abandonment of the generating station and associated mine. This represents a direct transfer from ratepayers of nearly $45,000 per worker. These funds are administered by PNM and left to its discretion. PNMs current proposal allots $17.8 million for severance and $2.8 million for job training (PNM 2020). This proposal shows a preference for PNM's directly employed generating station workers over workers at the independently owned coal mine. Displaced generating station workers receive nine months severance as well as $10,000 per year towards job training. Coal workers receive six months severance and a one-time $6,000 scholarship through New Mexico Workforce Solutions (PNM 2020). Combined with other provisions in the bill, these funds are intended to transition displaced fossil fuel workers into new jobs in renewable resources.

In addition to assisting directly displaced workers, SB 489 provides support for affected communities that stand to lose tax revenue. SB 489 raises an additional $20 million from ratepayers to establish two funds intended to soften the transition for communities that are economically dependent on the generating station and associated mines. The smaller of the two funds, the Energy Transition Economic Development Assistance Fund, receives 1.65% of bond proceeds, estimated at $6 million, to be distributed in the affected county to promote economic development opportunities unrelated to fossil fuel use. The exact disbursement of funds is subject to a public planning process with at least three meetings held in the affected community. The larger fund, The Energy Transition Displaced Worker Assistance Fund, receives 3.35% of bond proceeds to be administered by the Workforce Solutions Department. In contrast to the severance and job training administered by PNM, the Displaced Worker Assistance Fund applies to any worker who loses their job as a result of abandonment, not just PNM employees. This fund is used to help displaced workers find new jobs through existing Workforce Solutions Department programs as well as certified apprenticeships.

The above-mentioned programs soften the impacts felt by displaced workers and their communities but do not directly transition fossil fuel workers to new jobs in clean energy. To complement these programs, SB 489 includes two important provisions with the common goal of creating new clean energy jobs in affected communities. First, it establishes an apprenticeship mandate to ensure that jobs created by replacement resources are made available to displaced workers. The bill requires any construction of a new electricity generating facility to employ apprentices as at least 10% of the workforce. This percentage increases to 17.5% in 2024 and 25% in 2026. Combined with the Displaced Worker Assistance Fund, this mandate creates a pipeline for displaced workers to transition to new jobs through fully funded apprenticeship

programs. Furthermore, SB 489 directs the Workforce Solutions Department to develop rules that encourage diversity in the program specifically targeting disadvantaged communities and those that are underrepresented in the industry.

Second, Section III of the bill outlines regulations for the location of resource development after abandonment. The bill directs the Public Regulation Commission to prioritize replacement resources based on their economic development opportunity and ability to provide jobs with comparable pay and benefits to those lost. PNM is currently in the process of proposing replacement resources for SJGS. Their proposed plans reveal the tradeoffs between transitioning to clean energy and supporting fossil fuel-dependent communities. The abandonment of SJGS represents a total loss of over $9 million of property tax revenue for San Juan County, its school district, and its community college (O'Donnell 2019). Initial analysis by independent consultant Dr. Kelly O'Donnell (2019) estimates that redevelopment of the plant and mine sites with solar PV would more than cover this lost revenue while replacing it with natural gas would not. However, PNM's proposal replaces SJGS with a 280 MW natural gas facility while adding 350 MW of solar outside of San Juan County (PNM 2019). Additionally, the natural gas facility will need to be replaced with renewables by 2045 to meet CES requirements. PNMs choice of natural gas realizes concerns raised by environmental and community groups that SB 489 does not offer sufficient oversight of replacement resources (New Energy Economy 2019, Cantor 2019).

Despite receiving an endorsement from the president of the Navajo Nation, Jonathan Nez, SB 489 has repeatedly drawn criticism from Indigenous advocates including local Navajo Nation chapters (Indigenous Peoples of the Southwest & Allies 2019, Cantor 2019). New Mexico's energy policy decisions disproportionately affect Indigenous communities, yet they are often left

out of policymaking. Indigenous ancestral lands in the Four Corners region were officially designated a national sacrifice zone by the Department of Energy and experience high levels of extractive activities (Indigenous Peoples of the Southwest & Allies 2019). As a result, the fossil fuel industry has provided economic opportunity to Indigenous communities but has also degraded their land, air, and water. SB 489 protects displaced workers but does not include any provisions specific to Indigenous equity except a one time, $1.8 million deposit in the Indian Affairs Fund. Regardless, in the case of SJGS, a significant portion of funds will benefit Indigenous workers. Navajo workers comprise 27% of the station's workforce and 50% of the coal mine's labor force. In total, 304 Navajo workers, contractors, and suppliers will qualify as displaced workers and receive benefits (PNM 2020). However, for many Indigenous leaders, a just transition means not only protecting displaced workers but also reclaiming degraded land and providing support for historically disadvantaged communities (Indigenous Peoples of the Southwest & Allies 2019). Indigenous advocates proposed multiple amendments that were rejected including the full remediation and restoration of impacted areas, support for addressing long-term health impacts, support for infrastructure including electricity and roads in frontline communities, and consultation with Indigenous groups in all stages of decision making.

SB 489 highlights the interconnected challenges of addressing distributional equity in CESs. New Mexico has clearly decided to prioritize fossil fuel workers and fossil fuel-dependent communities. As Indigenous leaders and some environmental groups have pointed out, this choice comes at a cost. Most notably, there will be a significant cost to ratepayers in the form of a literal line item labeled "energy transition charge." On top costs to ratepayers comes the opportunity cost of choosing not to protect other affected communities. In New Mexico, this means that frontline Indigenous communities degraded by fossil fuel extraction will not see

specific stimulus or remediation. Thus, SB 489 confronts economic impacts directly related to the CES but does not address the historical inequities of the fossil fuel industry.

Finally, SB 489 has overwhelmingly focused on the retirement of coal power plants, leaving uncertainty around natural gas generating infrastructure. The securitization process outlined in SB 489 only applies to coal-fired generation. Natural gas currently provides nearly the same amount of electricity as coal and is expected to need to increase to replace coal resources. There is an implicit assumption that natural gas will serve as a transition resource, but no efforts are made to prevent these assets from being stranded when natural gas is phased out by 2045. While natural gas plants are not as large or concentrated as coal plants, their retirement will still have wide-sweeping economic impacts. As it currently stands, local communities affected by natural gas plant closures will not benefit from any of the economic development programs established in SB 489. New Mexico's overwhelming focus on the short-term retirement of its two remaining coal plants threatens to create significant financial liabilities in the long term.

At least in the short term, New Mexico's SB 489 provides an excellent blueprint for protecting fossil fuel workers and their communities from the economic impacts of the early retirement of fossil fuel generating facilities. As opposition from indigenous advocates and environmental groups has shown, not everyone considers this a sufficient benchmark of a just transition. It does, however, reflect the reality of New Mexico's political landscape. With some caveats, SB 489 offers lessons on how energy-producing states can soften the local economic impacts that CESs impose on fossil fuel-dependent communities.

V. California's Cost Softening

Higher electricity prices present a particularly difficult challenge for California where rates are already nearly twice the national average (EIA 2019c). Fortunately, as an early adopter of clean energy, California has a roadmap for balancing affordability, reliability, and clean energy targets. California was building out utility-scale solar as early as the 1980s when the economics were far less favorable (St. John 2019). The state's legacy of expensive renewable energy contracts and early retirement of cheap nuclear and fossil fuel plants have led to some of the most expensive electricity rates in the country. Despite these high rates per kWh, California has managed to keep monthly electricity bills affordable through a long-term commitment to cost softening programs. As California approaches full decarbonization, these programs will be essential for maintaining energy affordability, especially for California's most vulnerable communities.

When California passed SB 100 in 2018, mandating that utilities achieve net-zero carbon emissions by 2045, it did not signal a drastic change but rather marginally extended a long history of clean energy policy. Thus, it is essential to consider not only SB 100 but also its policy context. While SB 100 does not adopt any new provisions focused on equity, its adverse distributional impacts will be mitigated by a robust suite of supporting policies. These policies focus on softening costs to ratepayers through energy efficiency, weatherization, and direct rate assistance. California's unique cap-and-trade system also plays an essential role in supporting SB 100 by generating revenue to fund some of these programs.

Prior to SB 100, California already had one of the highest clean energy targets in the United States. SB 350, passed in 2015, set a mandate for 50% of the state's electricity to come from renewable resources (not including nuclear and large hydro) by 2030. SB 100 raised this

target to 60% and further mandated that by 2045 the remaining 40% of electricity generation achieve net-zero carbon emissions. In addition to laying the foundation for SB 100, SB 350 combined the CES with an energy efficiency mandate. The mandate requires utilities to double the projected energy efficiency savings of retail customers by 2030, equating to roughly 80,000 GWh of electricity savings (CEC 2017). This goal would significantly soften the total costs felt by consumers by reducing their overall usage. Furthermore, SB 350 directs the California Public Utilities Commission (CPUC) to prioritize low-income and disadvantaged communities for these energy efficiency savings. With this provision, the energy efficiency mandate serves as a powerful tool to counteract the regressivity of electricity rate increases associated with the CES.

Due to the high upfront costs of energy efficiency improvements, the CPUC administers specific ratepayer-funded programs to lower barriers to access for low-income households and ensure these goals are met. These programs broadly represent indirect cost softening measures that make electricity more affordable by reducing overall usage. A common challenge with indirect cost softening programs arises from the low level of homeownership among income-qualified households, which can make it difficult to direct the benefits to the intended recipients. For example, the Energy Savings Assistance Program (ESA) provides no-cost weatherization services and energy efficient appliances to households with a total income below 200% of the federal poverty line or that are enrolled in other public assistance programs such as Medicaid/Medi-Cal (CPUC 2019). However, of the roughly 13 million Californians that qualify for ESA, nearly 6 million are renters, the majority of which reside in multifamily units (EEFA 2018). Multifamily renters have historically utilized ESA at a disproportionately low rate despite experiencing higher energy burdens (EEFA 2018). Misaligned benefits between owners and renters are primarily to blame for preventing the deployment of ESA in these households. As a

result, many of the most energy burdened individuals have been precluded from accessing ESA. Thus, while ESA represents an overall transfer from higher-income ratepayers to lower-income ratepayers, the benefits are concentrated in the relatively wealthier subset of low-income ratepayers who own homes.

Direct rate assistance offers an easier way to direct cost softening to low-income ratepayers, but it does not have the same environmental benefits as energy efficiency. California has two programs that subsidize the price of electricity for low-income households, California Alternate Rates for Energy (CARE) and Family Electric Rate Assistance Program (FERA). CARE provides a 30-35% discount on electricity for households below 200% of the federal poverty line and FERA provides a smaller discount of 18% to families that fall between 200 and 250% of the federal poverty line (CPUC 2020a). Similar to ESA, these programs are funded entirely by charges to higher-income ratepayers. While these direct rate assistance programs will continue to provide crucial support for around one-third of Californians, they have limited room for expansion. The state sees far more potential in indirect cost softening programs such as ESA despite their distributional challenges.

In addition to softening costs for low-income households, California protects households that may be disadvantaged in other ways. California identifies these disadvantaged communities through a cumulative impact assessment known as CalEnviroScreen. The assessment identifies communities (defined as census tracts) that are at the highest risk of environmental harm, taking into account both levels of environmental pollution and population characteristics (Office of Environmental Health Hazard Assessment 2017). CalEnviroScreen assesses communities based on 20 distinct indicators that measure exposure (e.g. PM 2.5 concentration), environmental effects (e.g. number of hazardous waste facilities), population sensitivity (e.g. rate of asthma)

and socioeconomic factors (e.g. educational attainment). Using these indicators, CalEnviroScreen produces an aggregate score for each census tract. Census tracts scoring in the highest 25% are designated "disadvantaged communities" under California law. Collectively, these indicators offer a more nuanced approach to equity than income levels alone. Environmental pollution indicators incorporate communities that suffer disproportionately from environmental damages, especially those caused by the fossil fuel industry. Population characteristic indicators go a step further to address underlying systemic inequities that have led some communities to be more vulnerable. California's approach paved the way for other states, including Washington and New York, to incorporate complex definitions of equity into clean energy policy through cumulative impact assessments.

CalEnviroScreen enables California to go beyond softening individual households' costs to reinvest in entire communities. Most notably, the legislature has used CalEnviroScreen to direct funds raised by California's cap-and-trade program to disadvantaged communities. California's cap-and-trade program raises revenue each year by auctioning off emissions allowances to polluting companies. Cap-and-trade auction proceeds fund community investments through California Climate Investments (CCI). These projects include affordable housing, renewable energy, public transportation, zero-emission vehicles, environmental restoration, sustainable agriculture, and recycling initiatives (CalEPA 2017). When cap-and-trade was implemented in 2012, SB 535 required 25% of the proceeds to fund projects that provide benefits to disadvantaged communities. Later in 2016, AB 1550 tightened this restriction such that these projects must be located within disadvantaged communities, not just benefit them. Secondly, AB 1550 apportioned an additional ten percent to low-income households or communities. While the primary goal of the cap-and-trade program is to reduce GHG emissions, many of the projects

funded through CCI soften costs for ratepayers in disadvantaged communities through investments in energy efficiency and distributed generation. In this way, disadvantaged communities are protected from adverse impacts of California's CES through reinvestment funded by cap-and-trade. The Solar on Multifamily Affordable Housing (SOMAH) Program is an excellent example of such reinvestment.

SOMAH showcases the potential for cap-and-trade proceeds to mitigate the electricity rate impact of SB 100 for low-income and disadvantaged communities. The program directs $1 billion over ten years to subsidize solar energy systems on multifamily affordable housing units with the explicit goal of developing solar capacity in disadvantaged communities and decreasing energy bills for low-income tenants (CPUC 2020b). SOMAH was the first program in the U.S. to direct the savings created through the use of solar energy back to the utility bills of renters (CEJA 2015). In this way, the program breaks barriers that have historically excluded the most energy burdened households from accessing the cost savings from solar. SOMAH shows how CCI's community-based approach can unlock savings beyond programs targeting individual households.

SOMAH has also revealed increasing polarization between labor unions and environmental justice organizations over distributed generation versus utility-scale solar. While rooftop solar can soften costs for low-income ratepayers, it does not create the same high-quality, union jobs as utility-scale solar. California has had success creating high-quality jobs by utilizing federally protected project labor agreements in the construction of utility-scale renewable energy projects. Almost all large-scale renewable energy projects have used collective bargaining agreements ensuring high wages as well as health benefits and pension plans. Additionally, project labor agreements employ apprentices under the state-certified apprenticeship system.

Under these apprenticeships, entry-level, unskilled workers obtain free training, a job, and a path toward a middle-class career. Rooftop solar, on the other hand, does not utilize project labor agreements and instead creates low-quality jobs with little opportunity for advancement (Zabin et al. 2016). In this way, utility-scale solar offers a competing strategy for equity through economic opportunity rather than cost softening.

A study by the UC Berkeley Labor Center found that project labor agreements are creating opportunities for workers from disadvantaged communities. In 2017, people of color represented 60% of new apprentices compared to 57% of the workforce as a whole and workers from disadvantaged communities, representing 25% of the state's population, filled 43% of entry-level solar power plant construction jobs (Luke et al. 2017). While distributed generation, especially in disadvantaged communities, also creates jobs for workers from disadvantaged communities, the jobs do not have the same economic benefits. A key step towards uniting labor unions and environmental justice groups is adopting stricter labor standards for energy efficiency and distributed generation. Combining cost softening with economic development in this way would not only mitigate the impacts of the CES but also further California's goals to invest in disadvantaged communities.

For the most part, California has focused on making clean energy jobs accessible to low-income and disadvantaged workers. Transitioning fossil fuel workers into the clean economy has proved more difficult, especially due to uncertainty around the future of natural gas electricity generation. SB 100 loosely defines the final 40% of California's CES as zero-emissions. This leaves the door open for large hydro, nuclear, and importantly, gas-fired power plants with carbon capture and sequestration (CCS). This option depends on the commercial viability of CCS, a still unproven technology. Additionally, concerns have been raised over a loophole that

could keep some natural gas-fired power plants running. Southern California Edison has argued that the CES only covers electricity sold to retail customers, not the 7-8% of electricity lost in transmission (S&P Global 2019). This interpretation would allow natural gas to continue to provide 7-8% of the total electricity generated. The CPUC has yet to make a definitive decision, setting up an impending regulatory battle. This uncertainty over the future of natural gas generation has overshadowed transition plans for these workers. Regardless of the final ruling, the natural gas workforce will be significantly reduced and replaced by clean energy workers. California has gone to great lengths to shield low-income households and disadvantaged communities from the effects of the transition to clean energy but has not prioritized fossil fuel workers in the same way.

Overall, California's experience balancing affordability, reliability, and clean energy targets has centered equity in the policy framework supporting SB 100. Specifically, California (1) mitigates the impact of high electricity rates through cost-softening measures targeted towards low-income ratepayers, (2) directs investment in clean energy and energy efficiency to disadvantaged communities, and (3) ensures clean energy jobs are both high paying and made available to members of disadvantaged communities. California's framework shows a strong preference for protecting low-income households and disadvantaged communities often at the expense of the fossil fuel industry. This preference reflects renewable energy developers' and environmental justice advocates' powerful influence in California's progressive legislature. While California provides a tested model for protecting low-income households and disadvantaged communities, this approach is unlikely to succeed in states with more conservative legislatures or more powerful fossil fuel interests.

VI. New York's Green New Deal

New York's CES legislation, known as the Climate Leadership and Community Protection Act (CLCPA), stands out as one of the most ambitious state-level clean energy policies in the United States. The CLCPA not only mandates 100% clean energy from the electricity sector by 2040 but also mandates net-zero emissions from the economy as a whole by 2050. This provision significantly expands the scope of the CLCPA beyond typical CES legislation. Electricity generation is only the third-largest source of GHG emissions in New York, trailing both transportation and fossil fuel combustion in buildings (NYSERDA 2018). Decarbonizing these two additional sectors will require switching to electric alternatives powered by a carbon-free grid. In this way, the CLCPA will not only change the nature of electricity generation but will also drastically increase the demand for electricity. Collectively, these mandates represent a complete transition of New York's economy to a clean energy economy.

Recognizing the fundamental transformation that the CLCPA represents, environmental justice groups have led the charge to ensure that the act incorporates equity as an integral component. NY Renews, a coalition of nearly 200 environmental, labor, and social justice organizations paved the way for the CLCPA when it introduced the Climate and Community Protection Act (CCPA). The final CLCPA is a combination of the CCPA and Governor Cuomo's Climate Leadership Act that maintains the core emphasis on equity advocated by NY Renews. The bill itself not only acknowledges the heightened vulnerability of disadvantaged communities but asserts that clean energy policy should prioritize the health of disadvantaged communities, control regressive impacts of future climate change policies, and allocate public investments in

these communities (§ 75-0101.7). With these lofty goals, the CLCPA is not only one of the most ambitious clean energy policies but also arguably the most ideologically progressive.

The CLCPA delegates the implementation of its ambitious goals to the newly created Climate Action Council (CAC). The 22 members of the council are tasked with determining how New York will achieve the emissions targets established by the CLCPA. The CAC consists of 12 commissioners and presidents of state agencies as well as two members appointed by the governor, three each by the majority leaders of the house and the senate, and one each by the minority leaders. The appointees cover a range of business leaders, government officials, environmental advocates, and academics. Raya Salter, an attorney with NY Renews, and Peter Iwanowicz, executive director of Environmental Advocates of New York, stand out as proven advocates for environmental justice (French 2020). On the other side, the minority leaders' appointments provide two voices for the fossil fuel industry in Gavin Donohue of the Independent Power Producers of New York and Donna DeCarolis, a fuel executive with National Fuel Gas (New York Climate Action Council 2020). The CAC is responsible for developing a scoping plan to achieve the goals set out in the CLCPA. In this way, these 22 councilmembers have immense power to shape the priorities of the CES.

While the CAC has the final say on the act's implementation, they are required to incorporate newly created advisory groups in the planning process, including the Climate Justice Working Group and the Just Transition Working Group. The Just Transition Working Group, chaired by the commissioner of labor, is responsible for providing recommendations to the council on opportunities for workforce development with a focus on disadvantaged communities and members of groups underrepresented in the energy industry. In addition to advising the Climate Action Council on issues of environmental justice, the Climate Justice Working Group

is tasked with defining and identifying "disadvantaged communities" for the purpose of the CLCPA. This definition is crucial for determining the recipients of specific protections and carveouts created in other parts of the act. The act includes guidelines for the Climate Justice Working Group which offer insight into what communities the act's equity provisions are intended to prioritize.

Disadvantaged communities, according to the CLCPA, will be identified through a cumulative impact assessment with three main metrics: public health, socioeconomic status, and climate vulnerability. Under public health criteria, the act directs the Climate Justice Working Group to identify areas burdened by "cumulative environmental pollution." By protecting communities burdened by cumulative environmental pollution, New York acknowledges and seeks to address historical environmental inequities, not just current ones. Similarly, in defining criteria for socioeconomic status, the CLCPA includes communities with high concentrations of members of groups that have historically experienced discrimination on the basis of race or ethnicity. Diverging from other states, New York uses its CES to explicitly address racial inequity. Furthermore, the prioritization of climate-vulnerable communities represents a novel approach to equity in CESs. The CLCPA not only identifies disadvantaged communities who are burdened with the extractive pollution of the fossil fuel industry but also those that are at higher risk of the impacts of climate change. The bill lists flooding, storm surges, and urban heat island effects as examples of potential impacts.

While the CLCPA provides some oversight, the bulk of the process is left up to the Climate Justice Working Group. The guidelines do not cover how crucial terms, such as "cumulative environmental pollution," will be defined or what sources of data should be used. The Climate Justice Working Group faces an extremely difficult task balancing the myriad of

criteria outlined in the CLCPA such that disadvantaged communities are accurately identified but not so liberally included as to dilute their protections. Importantly, the CLCPA emphasizes community engagement in the development of these criteria. The Climate Justice Working Group is required to publish a draft list of criteria and disadvantaged communities and then hold six public hearings before finalizing their decision. New York's use of community engagement is fundamental to its commitment to equity.

The CLCPA prioritizes disadvantaged communities, however they are identified, through a variety of measures. Most notably, § 75-0117 of the CLCPA requires that 35% of the "overall benefits of spending" go to disadvantaged communities and aims for 40%. While the regulation appears ambitiously progressive on paper, it is full of ambiguity. The language has been significantly loosened from earlier drafts of the bill. The bill initially mandated the state to allocate 40% of existing climate and clean energy funding, roughly $370 million, to disadvantaged communities for community determined climate solutions. PUSH, one of NY Renews core members, has criticized the final bill for eliminating this clear and immediate investment in favor of an ambiguous and unenforceable goal (Bono 2019). Furthermore, the final version shifts the decision-making power from communities themselves to state agencies. Regardless, this goal represents an unparalleled commitment to distribute the benefits of the clean energy transition to historically marginalized communities.

In addition to economic benefits, the CLCPA aims to direct reductions of environmental pollution to disadvantaged communities. First, the community air monitoring program specifically targets disadvantaged communities with high exposure to toxic air contaminants and criteria air pollutants. The Department of Environmental Conservation will identify high priority locations in disadvantaged communities to deploy air monitoring systems. These systems will

measure concentrations of local pollutants and make the data publicly available. The department will use these systems to assess and identify contributing sources and then prepare a strategy to reduce emissions from these sources. The final result will be locally tailored community emissions reduction programs implemented by the department. Secondly, a separate section of the act requires that, in meeting its GHG reduction goals, the state prioritizes projects that eliminate criteria pollutants in historically disadvantaged communities. In this way, the CLCPA couples local co-pollutants with GHG emissions to influence where emission reductions occur and what communities they benefit.

In the electricity sector specifically, the CLCPA uses technology carveouts to ensure that disadvantaged communities receive environmental benefits. The bill directs the regulatory commission to prioritize the deployment of clean energy technologies, including battery storage and distributed solar, in disadvantaged communities. Furthermore, the battery storage mandate aims to replace fossil fuel peaking plants that disproportionately harm disadvantaged communities. Peaking power plants are those which only operate during the highest periods of demand and tend to be the oldest and most polluting. In New York, these plants are disproportionately located in low-income communities and communities of color (Spector 2019). The CLCPA intends to replace these plants with battery storage that can provide the same peaking service with zero emissions. Batteries can be charged during periods of low demand when solar and wind are abundant and then dispatched during periods of high demand when New York would otherwise have to turn to peaking plants. The CLCPA mandates a staggering three gigawatts of battery storage by 2035 with a yet-to-be-determined minimum percentage located in disadvantaged communities. For reference, the entire U.S. currently has less than one gigawatt of battery storage capacity (EIA 2019a). New York's investment in this expensive and

underdeveloped technology signals its commitment to delivering environmental benefits to disadvantaged communities, even if it comes at a high cost.

Beyond these specific carveouts, it is not entirely clear how the general equity provisions in the CLCPA will manifest themselves in the electricity sector. The equity considerations relevant to the CES in isolation will depend on the interpretation and application of fairly ambiguous goals. For example, it is unclear what, if any, "overall benefits of spending" will result from a mandate on renewable electricity generation. It is possible that job creation and economic development from renewable energy would qualify as an overall benefit, in which case the Public Services Commission would have to ensure that 35% of these benefits go to disadvantaged communities. While this provision would be difficult to enforce, it could significantly raise the cost of compliance by limiting where new projects can be located.

Despite demands from labor unions and environmental justice advocates, the final CLCPA does not contain strong labor provisions for a just transition. The originally introduced bill included labor and training standards as a foundational equity component. However, over the legislative process, these protections were slowly stripped away culminating in Governor Cuomo striking them entirely. The proposed provisions would have provided a safety net for displaced fossil fuel workers, ensured competitive wages for renewable energy workers, and established apprenticeship and workforce development programs (NY Renews 2018). Furthermore, the original bill included economic dependence on fossil fuels as a fourth criterion for identifying disadvantaged communities, but the final bill excludes this provision. These last-minute amendments stripped protections for both existing fossil fuel workers and future clean energy workers. With the absence of these stipulations, the final CLCPA contains next to no language related to workforce impacts. The sole section addressed towards labor, § 5, reads, "this act shall

be subject to current prevailing wage law." Despite some pushback, the CLCPA kept its support from key labor coalitions including SEIU (Roberts 2019 b). NY Renews has since turned towards pressuring the Climate Action Council to prioritize workers' rights in their eventual scoping plan (NY Renews 2020).

The CLCPA and its CES are undoubtedly cutting edge both in their targets and commitment to equity. However, New York's ability to achieve the equitable transition it envisions will depend entirely on the act's implementation. Relative to other CESs, the CLCPA more closely resembles a loose amalgamation of goals. If enacted as intended, the CLCPA could live up to its reputation as the precursor to the Green New Deal (Calma 2019). On the other hand, New York may run into political and economic difficulties and have to choose between staying true to its principles of equity and achieving the overarching goals it set out to achieve. In this case, the last-minute weakening of equity provisions will show, as binding GHG reduction commitments are pitted against ambiguous and unenforceable equity metrics. Regardless, New York's CLCPA presents an innovative approach to clean energy equity that addresses not just immediate distributional impacts but also attempts to remedy historical and future environmental injustice.

VII. Washington's Utility Business Model Reform

With an abundance of renewable resources and some of the lowest electricity rates in the country, Washington is well positioned to lead the way in the transition to clean energy. In May 2019, Governor Jay Inslee signed SB 5116, known as The Clean Energy Transformation Act (CETA), to mandate the transition to 100% clean energy by 2045. Washington already produces more renewable energy than any other state with more than two-thirds of its electricity coming

from large hydroelectric generating stations (EIA 2019b). Due to the low operating costs of these facilities, Washington also has some of the cheapest electricity nationwide. Despite already having the third-lowest electricity rates in the country, Washington prioritizes maintaining affordability in CETA (EIA 2019b). Electricity affordability is particularly important in Washington due to high levels of electrification. Nearly 60% of Washington consumers heat their homes with electricity compared to less than 40% nationwide (EIA 2019b and U.S. Census Bureau 2018). Furthermore, Washington is pushing to increase this percentage in order to reduce carbon emissions from natural gas heating. As a result, rate increases are more regressive in Washington compared to in other states where a smaller fraction of consumers' energy needs are met by electricity. To address this concern, CETA heavily weighs equity and energy affordability in the transition to clean energy. While Washington's transition to 100% clean electricity requires less extreme measures than most states', CETA still offers important lessons for equity strategies in CESs. CETA establishes the tools necessary to prioritize equity effectively through utility business model reform and cumulative impact assessment.

CETA implements a unique step-up CES that enables utilities to minimize compliance costs. Initially, it phases out all coal-fired production, currently 14% of total electricity generation in the state, by 2025 (EIA 2019b). Secondly, it requires utilities to be carbon neutral by 2030. In the same year, CETA mandates that 80% of electricity must come from non-emitting resources (i.e. renewables, nuclear, or natural gas with carbon capture and sequestration) while 20% can be produced by emitting resources and then offset in any one of three ways. First, utilities can buy renewable energy credits from other utilities or independent power producers who produced excess renewable energy. This is a common market-based mechanism used in most CESs. Second, utilities can make an alternative compliance payment amounting to

$100/tCO2e. Washington's CES stands out for its potential to generate revenues through these alternative compliance payments. CETA directs these revenues, as well as any other non-compliance fees, to the Low-Income Weatherization and Structural Rehabilitation Assistance Fund. The fund is to be used to maximize monetary and energy savings for low-income households through energy efficiency and weatherization. In this way, these compliance payments represent a transfer from non-compliant utilities to low-income consumers. The extent to which utilities will use these alternative compliance payments is currently unknown. Regardless, they represent an innovative strategy for directing CES proceeds towards cost softening measures for low-income households.

The third way utilities can offset emitting resources is by engaging in energy transformation projects (ETPs) in local communities. These projects must reduce fossil fuel consumption and GHG emissions while providing energy related benefits to utility customers. ETPs could include weatherization, rooftop solar, electric car infrastructure, or renewable natural gas projects for heating and cooking. This compliance mechanism can unlock cost effective GHG reduction strategies that fall outside the scope of a traditional CES. For utilities struggling to reliably and affordably decarbonize the final 20%, ETPs offer a low-cost way to reduce emissions while still providing benefits to local customers. Collectively, these alternative compliance mechanisms are designed to ease the transition from 2030 to 2045, the year in which the bill requires 100% of electricity to come from non-emitting sources.

CETA overhauls the traditional utility business model to align shareholder incentives with newly established state policy goals. Investor-owned utilities (IOUs) throughout the U.S. make profits exclusively from return on capital, which incentivizes them to pursue capital intensive investments like power plants and distribution infrastructure. Under this model, IOUs

have no incentive to encourage energy efficiency or distributed generation. In fact, consumers producing their own electricity, for example through residential solar panels, actually reduces the profits that utilities can make. As a result, utilities have to be forced by regulation to institute programs for energy efficiency or distributed generation. CETA enables the Utilities and Transportation Commission (UTC) to shift utilities from a return on capital to a performance-based business model. A performance-based model fundamentally changes the profit motive of IOUs. Under this structure, the UTC could establish different parameters to determine returns on investment. Rather than purely making returns off of capital investment, utilities could earn profits from achieving GHG reduction goals or equity metrics. This approach would give the UTC unprecedented leverage to prioritize equity through monetary incentives. For example, the UTC could set higher rates of return for utilities that meet targets for installing distributed energy resources in disadvantaged communities. While specific performance criteria are not defined in the bill, utility business model reform offers a novel way to center equity in the clean energy transition.

In addition to granting more power to the UTC, the bill directly modifies the regulatory compact taken on by utilities. The regulatory compact is essentially the agreement that utilities make in order to be granted monopoly power over the electricity market. The traditional regulatory compact obligates utilities to provide reliable power to every consumer at the lowest possible cost (Roberts 2019a). While states can prioritize other considerations through regulation, from the utility's perspective this regulatory compact legally determines their decision making. CETA adds new obligations to the regulatory compact for utilities in Washington. For example, the bill requires utilities to incorporate the social cost of carbon, as established by executive order, into all decision making. The social cost of carbon is initially set

at $68/tCO2e but will rise to $116/tCO2e by 2050. When utilities are deciding what resources to develop or assessing the cost of conservation policies, their analysis must include the social cost of carbon. The new regulatory compact also forces utilities to prioritize equity. The bill mandates that, in all decision making, utilities must "ensure that all consumers are benefitting from the transition to clean energy through the equitable distribution of energy and nonenergy benefits and reduction of burdens to vulnerable populations and highly impacted communities" (Sec. 4.(8)). In this way, CETA fundamentally incorporates equity into the utility's decision-making process.

Through its equity goals, CETA protects communities at risk of environmental harm as well as Washington's Indigenous communities. In the regulatory compact, CETA establishes two designations for protected communities, "highly impacted communities" and "vulnerable populations." The state Department of Health determines "highly impacted communities" through a cumulative impact assessment similar to California's CalEnviroScreen. The assessment designates communities based on their exposure to adverse impacts of fossil fuel production and their vulnerability to climate change. Furthermore, the bill designates any census tract that contains Indigenous land as a "highly impacted community." This is an important inclusion for the more than 200,000 Indigenous residents in Washington. Unlike New Mexico's, Washington's fossil fuel production is not generally located on Indigenous land. Therefore, including all Indigenous land as "highly impacted communities" primarily addresses historical inequity unrelated to fossil fuel production or climate change. CETA directly defines criteria for "vulnerable populations." These include people from communities that experience a disproportionate risk from environmental burdens due to socioeconomic stressors such as high unemployment rates or sensitivity factors, such as low birth weight.

In addition to incorporating protections for highly impacted communities into utility decision making, the bill takes concrete steps to protect low-income ratepayers from rate increases. First, CETA sets a limit of 2% of annual revenue on the incremental cost that the CES can impose on utilities. The incremental cost of the CES is determined by comparing the cost of the utility's compliant portfolio against a baseline portfolio of least-cost technologies. If the incremental cost is projected to exceed 2% of the utility's annual revenue, the UTC extends that utility's deadline for the CES. Initial analysis from both E3 and Climate Solutions suggests that this possibility is highly unlikely over the duration of the CES (Olson and Ming 2019, Hall and Gutman 2018). In the event that the CES proves more expensive than expected, the 2% cap limits costs to utilities, protecting consumers from sudden rate increases.

CETA also establishes comprehensive cost softening measures that target low-income ratepayers through an energy assistance mandate. The bill requires every utility in Washington to establish programs and make funding available for energy assistance starting in 2021. Furthermore, these programs must prioritize low-income households with high energy burdens. The structure of this program directly ties energy assistance goals to equity outcomes. Energy assistance covers any program designed to reduce energy bills including weatherization, energy efficiency improvements, distributed generation, or even direct rate assistance. Under the bill, the state Department of Commerce has established a target of no more than 6% of household income to be spent on energy bills (Washington State Department of Commerce 2020). The UTC is now assessing the level of energy assistance necessary to achieve this target. CETA sets a goal of meeting 60% of energy assistance need by 2030 and 90% by 2050. Utilities are held accountable through biannual reports to the UTC. By setting goals based on this clear metric of energy

burden, CETA directly funnels energy assistance measures to those who are most affected by electricity rate increases.

On the production side, CETA establishes tax credits for clean energy construction that incentivize targeted hiring and collective bargaining agreements. The tax credit is structured in three tiers of increasing requirements. Clean energy projects qualify for a 50% tax credit if they prove to the Department of Labor and Industries that they have (1) procured from and contracted with women-, minority- or veteran-owned businesses, (2) utilized apprenticeship programs, and (3) shown a preference for hiring local workers (Sec. 18.(1).). Clean energy projects that meet these criteria can qualify for an even greater tax credit of 75% if they compensate all workers at prevailing union wage rates. Finally, clean energy projects qualify for a 100% tax credit if they are constructed under a collective bargaining agreement or project labor agreement. This piece of the bill was crucial to earning the support of renewable energy developers and labor unions. While the requirements strongly encourage union involvement, it remains to be seen how stringently the Department of Labor and Industries will enforce requirements for involvement of women- and minority-owned businesses. Furthermore, the bill does not include any protections for displaced fossil fuel workers.

Although the bill contains limited equity considerations for displaced workers, changes to the regulatory compact may lead to greater equity in energy production. If utilities truly ensure that the benefits of the transition to clean energy are distributed equitably, as the bill mandates, then they must address equity in the construction and operation of new clean energy facilities. However, it is unclear how this provision will be enforced and what extent of the utilities' responsibilities the new regulatory compact will cover. For these reasons, CETA provides far more robust protections for consumers than it does for energy workers. Furthermore, while the

bill sets concrete protections for consumers based on income, the provisions for highly impacted communities are less material. Washington's utility business model reform represents an ambitious and innovative approach to prioritizing equity, but its outcomes for disadvantaged communities will depend entirely on the state's ability to enforce a novel regulatory compact.

VIII. Lessons Learned

This section presents a comparative analysis of the four case studies, with the goal of identifying generalized lessons that can be applied to other states. The overview compares key elements of each states' CES (summarized in Table 1). Next, I examine in detail three common design considerations: cost softening, the workforce transition, and reparational equity. Finally, I discuss the role of CESs in the larger context of clean energy equity and social justice.

Overview

States differ significantly not only in the policy mechanisms they utilize but also in their fundamental approaches to equity. Whereas New Mexico prioritizes fossil fuel producers and fossil fuel-dependent communities, New York, California, and Washington focus their protections on ratepayers and disadvantaged communities. California in particular aims to balance ambitious clean energy goals with affordability. New York and Washington more aggressively pursue equity, including justice for historical inequity, with less concern for ratepayer costs.

New Mexico stands out as the only state to wholly prioritize impacts on producers. This reflects both the gravity of the impacts on New Mexico's producers as well as the state's economic dependence on fossil fuels. The impacts felt by fossil fuel producers will be greater in New Mexico than in other states. For example, New Mexico and Washington both rapidly phase

out coal. However, coal currently provides nearly half of New Mexico's electricity compared to only 14% of Washington's (EIA 2019b, EIA 2020a). As a result, New Mexico's CES represents a larger and more abrupt contraction of the fossil fuel industry that will have more severe economic impacts. On top of this, New Mexico's economy is both more fragile and more dependent on energy than the other states. New Mexico's decision to prioritize fossil fuel producers and fossil fuel-dependent communities is not purely a reflection of political values; it is more so a result of economic realities. The New Mexico case shows that 100% CES are feasible in even the most fossil fuel-dependent states as long as the workers and communities are adequately protected.

New York, California, and Washington are able to prioritize consumers because they face relatively smoother economic transitions. However, there is no clear method for protecting consumers, nor even consistency on which consumers are being protected. California attempts to minimize the financial impacts to ratepayers through a suite of cost softening programs. These programs include both direct rate assistance as well as energy efficiency and distributed generation. In this way, California shields its most vulnerable ratepayers from some of the highest electricity rates in the country. New York and Washington, on the other hand, attempt to integrate equity into their CES at a foundational level.

Their foundational approaches are ambitious but could be too loosely defined to implement effectively. The effectiveness of New York's mandate that 35% of the overall benefits of spending go to disadvantaged communities depends entirely on how "benefits of spending" are determined. California first implemented cap-and-trade with a similar provision. However, it ran into challenges interpreting "benefits" and responded by tightening the legislation so that the projects must be located in disadvantaged communities, not just benefit

them. New York could run into similar difficulties measuring and enforcing the overall distribution of benefits. Likewise, the effectiveness of Washington's new regulatory compact will depend entirely on how its terms are interpreted. Specifically, the state is currently deliberating on what exactly "the equitable distribution of energy and nonenergy benefits" means. As far as enforcement, Washington gives the public utilities commission unprecedented power through fundamental reform of the utility business model. New York and Washington's partial successes reveal the importance of effective enforcement mechanisms and clear metrics to achieve meaningful equity outcomes.

All three states go beyond simply protecting low-income ratepayers to also protect members of vulnerable communities. New York and Washington both follow California's lead by adopting cumulative impact assessments to identify disadvantaged communities. While all three assessments generally target communities that face disproportionate risk from environmental burdens, their criteria differ. New York and Washington both emphasize climate vulnerability and historical inequity, whereas California uses a stricter health-based approach. While New York and Washington identify communities that are at risk of climate related disasters such as floods and heatwaves, California does not. Secondly, on racial equity, California uses indicators correlated with race but does not explicitly address racial equity. Conversely, New York includes racial demographics as an indicator, and Washington automatically includes indigenous communities. These states' strong economies and progressive legislatures have afforded them the opportunity to aggressively protect disadvantaged communities. There is no clear blueprint for who should be prioritized and what methods will be most effective. As a result, these three states will play an important role in piloting experimental approaches to equity from which other states can learn.

While states' approaches to equity vary dramatically, several common policy design considerations have emerged. These include choosing cost softening mechanisms, managing industry interests in the workforce transition, and using clean energy policy to address historical inequities. Any state considering a 100% CES will need to grapple with these crucial policy design elements.

Cost Softening: Direct Rate Assistance vs. Energy Efficiency

States primarily address the regressive impact of higher electricity rates through energy efficiency and distributed generation programs rather than direct rate assistance. While many states offer direct rate assistance to low-income ratepayers, none of the states studied increased or expanded their rate assistance to soften the costs of a CES. Instead, states have chosen cost softening programs that simultaneously reduce GHG emissions. California, New York, and Washington have all coupled energy efficiency targets with their CES. However, these targets are less precise for achieving equity outcomes than direct rate assistance. Energy efficiency improvements and distributed generation have high upfront costs that preclude low-income homeowners. Furthermore, a significant percentage of low-income ratepayers do not receive the long-term benefits of these programs because they do not own homes. As a result, whereas direct rate assistance is easy to prescribe progressively, energy efficiency improvements and distributed generation tend to be distributed regressively.

Recognizing this issue, states have taken steps to ensure that low-income ratepayers have access to energy efficiency and distributed generation. California uses both ratepayer and polluter funded programs to provide no-cost energy efficiency improvements and rooftop solar to low-income households and renters. California's $1 billion SOMAH program addresses the issue of homeownership by directing the benefits of multifamily rooftop solar to renters. Washington

has taken a different approach, instead building equity goals directly into its energy efficiency target. Whereas California and New York aim for a statewide reduction in energy use, Washington targets a reduction in the financial burden of energy bills. In this way, Washington directly ties equity goals to clean energy targets, while California and New York do so much more loosely.

When their benefits are distributed equitably, energy efficiency and distributed generation can provide several advantages over direct rate assistance. Direct rate assistance can counteract clean energy goals by encouraging customers to use more electricity. Energy efficiency and distributed generation produce the opposite effect, advancing clean energy goals. Second, energy efficiency and distributed generation come with significant quality of life benefits. For example, California's ESA program provides appliance upgrades to low-income consumers at no cost, and SOMAH provides crucial energy resilience for vulnerable populations. Third, energy efficiency and distributed generation create local jobs. While these jobs may not have the same union benefits as utility-scale construction, they can provide economic development in dense urban areas. Energy efficiency and distributed generation programs are clearly preferable to direct rate assistance, but they require aggressive policy intervention to achieve an equitable distribution of benefits.

Workforce Transition: The Political Realities of the Just Transition

States attempt to ensure a just workforce transition through two main channels: the quality and allocation of new clean energy jobs and the protection of displaced fossil fuel workers. New Mexico's emphasis on protections for fossil fuel workers reflects the political environment of a state economically dependent on fossil fuels. Through the securitization of its remaining coal plants, New Mexico provides severance and job training to displaced workers at

the expense of ratepayers. Washington and California instead focus on creating new opportunities in clean energy that outweigh those lost in fossil fuels. Specifically, they encourage project labor agreements to ensure that clean energy jobs are high paying, family wage jobs. Washington, California, and New Mexico all utilize apprenticeship programs to attract workers to the sector. New Mexico additionally makes apprenticeships available to displaced fossil fuel workers through scholarship funds. Overall, Washington and California prioritize the quality of new clean energy jobs, while New Mexico prioritizes making these jobs available to displaced workers. These differences reflect the reality of these states' political environments. While New Mexico has been criticized for bailing out the fossil fuel industry, its CES provides a blueprint for meaningful climate policy in a moderate state with strong fossil fuel interests.

Labor provisions are a major source of conflict in the legislative process. These disagreements reveal the competing interests of labor unions, renewable energy developers, and environmental justice groups in CES policy. The results show the growing political power of renewable energy developers. New York's CES almost contained the most comprehensive measures for labor equity, including both a safety net for fossil fuel workers and wage standards. But they were completely removed at the last minute to please developers. In Washington, developers won substantial tax cuts in exchange for good faith efforts to diversify hiring. They defeated efforts to put concrete requirements on workforce diversity, effectively weakening these provisions. In California, developers have counteracted environmental justice groups' efforts to prioritize distributed generation. Even in New Mexico, developers won limited government oversight over replacement resources. There is potential for common ground amongst renewable energy developers and environmental justice groups, but so far CESs have revealed tensions more than they have brought these interests together.

Reparational Equity: Justice for Historical Inequity

The destructive history of the fossil fuel industry has forced clean energy policymakers to consider a broader definition of equity than that of traditional distributional equity. CESs are likely to impose significant costs on fossil fuel companies, yet New Mexico is the only state to directly address compensation for their stranded assets. New York, Washington, and California instead primarily direct compensation to the communities harmed by the fossil fuel industry. Whether or not fossil fuel corporations are deserving of compensation, this approach may leave behind vulnerable fossil fuel-dependent communities. States have not yet figured out how to protect fossil fuel workers and their communities without compensating a politically polarizing industry.

The choice to protect historically disadvantaged communities rather than directly impacted communities markedly differs from traditional approaches to distributional equity. Even though these historically disadvantaged communities receive a high proportion of the benefits of CESs in the form of pollution reduction, states use policy interventions to further prioritize them for reinvestment and energy assistance. This phenomenon represents an approach to equity that seeks to address historical injustice rather than simply distribute costs and benefits proportionally. Environmental justice groups have led the push for this type of reparational equity with mixed success. California, Washington, and New York's cumulative impact assessments incorporate historical inequity to varying degrees. Some of the factors considered, such as exposure to environmental harm or climate vulnerability, address inequities directly related to fossil fuel production, while others, such as socioeconomic status and public health, address more general inequities.

Race has emerged as a controversial issue within cumulative impact assessments and clean energy equity more generally. While race is already highly correlated with many indicators, New York and Washington directly address racial inequity through the explicit inclusion of racial demographics. Although California does not directly consider race, its disadvantaged communities are overwhelmingly dominated by racial minorities due to correlation with other indicators. New Mexico, on the other hand, does not prioritize Indigenous communities despite their close ties to the fossil fuel industry. New Mexico provides relief for displaced Indigenous workers, but it does not attempt to remediate the environmental destruction the fossil fuel industry has caused in Indigenous communities. Thus, New Mexico's commitment to exclusively distributional equity leads to the neglect of Indigenous communities. This division between distributional equity and reparational equity has emerged as a principal policy consideration in CESs.

Discussion

CESs are remarkably straightforward in theory but incredibly difficult to implement given the diverse set of competing interests. CESs bring powerful stakeholders to the table, including labor unions, environmental organizations, local environmental justice groups, renewable energy developers, the fossil fuel industry, and Indigenous communities. In developing these landmark policies, the voices for equity have often been overshadowed by the interests of those with more political power. As a result, states have overwhelmingly preferred sweeping commitments to the *concept* of equity, rather than concrete and enforceable requirements. These ambitious but ambiguous goals may be reinterpreted or ignored in the future if they threaten to prevent the achievement of the CES. Especially as states get closer to full decarbonization, this tradeoff between clean energy and equity goals will intensify. For this

reason, successful equity provisions must be enforceable and irreversible. Instead, policymakers have loosely defined equity goals to appease environmental justice advocates while ensuring that clean energy targets and economic interests will not be compromised.

Across the states studied there is no clear definition of equity among policymakers. While useful for describing the overall distribution of benefits, the simple definition of equity used in the economics literature misses the political reality. As seen in these four states, clean energy policy is deeply intertwined with the legacy of the fossil fuel industry. In order to reconcile this history, states need to address the interlocking systems of oppression that underlie the energy industry. Cumulative impact assessments represent the first step towards achieving this goal. However, their implementation has been thwarted by states' unwillingness to prioritize equity on the same level as clean energy targets and economic interests. While states have established comprehensive approaches to softening distributional impacts, the potential for broader social change has not yet been realized. The clean energy transition presents an opportunity to transform a national energy system steeped in institutional oppression into one based on equity.

Table 1. Comparison of Key Elements of State Level CESs

	New Mexico	New York	California	Washington
Key Distributional Issue	Fossil Fuel Displacement	Historical Inequity	Cost of Electricity	Benefits of Clean Energy
Principal Policy Mechanism	Securitization of fossil fuel infrastructure	Mandate on total distribution of benefits	Energy efficiency mandate	Utility business model reform
Strategy	• Severance and job training for displaced workers • Economic development in fossil fuel-dependent communities	• Reinvestment in historically disadvantaged and climate-vulnerable communities	• Energy assistance for low-income and disadvantaged communities	• Alignment of utility shareholder incentives with state policy goals
Characteristics of Protected Community	• Communities losing fossil fuel jobs and tax revenue	• Disproportionate risk from environmental burdens • Climate-vulnerable • Victims of racial discrimination	• Disproportionate risk from environmental burdens • Low-income	• Disproportionate risk from environmental burdens • Climate-vulnerable • Indigenous

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