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Capital City Ventures towards an Equitable Clean Energy Transition: A Case Study Comparison between Columbia, South Carolina and Richmond, Virginia

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Capital City Ventures towards an Equitable Clean Energy Transition:
A Case Study Comparison between Columbia, South Carolina and Richmond, Virginia

By

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of the Requirements for
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Thesis Summary

I have investigated the city scale efforts to transition towards clean energy. I researched the effects of state policy and energy market structure on localities' efforts to decarbonize their city grid. This includes two case studies about the cities of Columbia, South Carolina and Richmond, Virginia. These case studies serve as a comparison between two city's attempts to take advantage of or overcome challenges from state policy and utility regulations. In general, my thesis analyses the impact of larger political challenges in the U.S. from multiple levels of governance to adopt a clean energy grid and address climate change.

Abstract

Combatting climate change requires a rapid transition to renewable sources for energy generation. In the United States, the electricity sector alone accounts for 28% of greenhouse gas emissions (28%), with about 63% of electricity generation derived from burning of fossil fuels (EPA, 2020). In order to lower greenhouse emissions from the energy sector, federal, state, and local policies must pave the way for renewable energy and energy efficiency innovations and policies. However, political action to address the effects and combat the causes of climate change have been limited due to political gridlock at the federal level. In addition, under neoliberalism, environmental and economic deregulation at the federal level has meant federal and state environmental policies have been limited, environmental goals are typically sidelined for economic priorities, and federal environmental laws are often ineffective even when passed (Heynen et al. 2008; Pretchel, 2020).

Federal deregulation has coincided with the devolution of political responsibility to states and local governments, a shift that has spurred attention to municipal efforts to combat climate change (Konisky, 2017). Cities have emerged as both critical actors and victims of climate change, as they are responsible for up to 75% of global greenhouse gas emissions and are the home of the majority of the U.S. population and GDP (Bulkeley, 2010). Because of the threats of climate change, cities are being forced to contemplate how economic development and growth can occur while also addressing climate change stressors. Urban responses – such as setting goals for 100% clean energy – are often motivated by the growing dissatisfaction with lagging federal and state level action and are seen as a potential win-win scenario for climate change responses (Bulkeley 2010). As a result, over 170 cities have set goals for 100% clean energy.

While cities have emerged as key actors in the fight against climate change, a gap has emerged between declarations for 100% clean energy and the meaningful implementation of those goals (Hallegatte 2008). Cities are challenged by questions of equity and institutional capacity, as the increased development of city initiatives for energy efficiency and carbon control may reinforce structural energy poverty issues (Reames, 2016; Welton, 2017). Municipal governments also face challenges stemming from the multi-level governance of the energy sector in the U.S., which requires attention to local, state, regional and federal regulations (Bulkeley 2005). Therefore, in order to create a more equitable approach, multiple climate policies may be mainstreamed within affordable and justice-oriented urban planning practices (Viguié, 2012) while also developing more equitable initiatives that are controlled by actors and entities outside of their jurisdiction (Konisky, 2017).

In several Southeastern U.S. cities, mayors and city officials have passed resolutions and created city climate action plans in order to demonstrate leadership for a clean energy future. Two states, South Carolina and Virginia, have different approaches and unique sets of challenges and opportunities based on the structure of the state's energy markets and state level governance. Virginia's electricity mostly comes from Dominion Energy, a Richmond, Virginia based investor-owned utility. The state is part of a Regional Transmission Organization, PJM, that covers multiple states, and it is also subject to state-level clean energy requirements. While South Carolina is also served by Dominion, the state has no access to competitive energy markets and has limited clean energy legislation. In Columbia, SC, Dominion holds a monopoly franchise to provide the city's electricity, but the utility is held less responsible for renewable energy innovations without state legislation direction.

The case of Columbia and Richmond provides an interesting contrast and demonstrates the multiple levels of utility governance. The home states differ in their responses to climate change in part because of political debates over the role of government to interfere with the fossil fuel industry. With Virginia's state level legislation requiring clean energy sources, its cities may be better poised to set their own clean energy goals and emission reduction targets, particularly when compared to South Carolina's delayed movement towards clean energy legislation.

Introduction

Over the course of environmental policy history in the United States, definitions of the environment and more recently the term sustainability has significantly evolved. From the tension between conservation for the sake of the environment in contrast to anthropocentric views of human domination over nature, U.S. environmental policy during the 1960s and 70s recognized the interconnected nature and relationship between humans and the environment. With the birth of the modern environmental movement in the 1960s, marked by monumental legislation such as the Clean Air Act and National Environmental Policy Act, citizens realized how their actions have impacted the environment as well as their own health and wellbeing (Rinfret 2019). As environmental harms and impacts affected people's daily lives, bipartisan environmentalism grew throughout the country during an era of monumental environmental regulation.

However, in the 1980s the Reagan administration spurred a disintegration of bipartisanship consensus in the wake of neoliberal economic priorities and debate over governmental regulation. The budget for the Environmental Protection Agency (EPA) was cut, and with the broadscale movement for deregulation, the U.S. experienced a significant shift in how environmentalism would be understood moving forward (Rinfret 2019). From the 1980s to 1990s, the U.S. experienced both policy retrenchment and political gridlock, which produced the partisanship seen today in which Democrats are assumed to be more pro-environment than their Republican colleagues (Konisky 2008). This produces a conflicting view that economic progress and environmental protection cannot go together. Despite surges in environmentalism especially with Bill Clinton and Al Gore, partisan gridlock has impeded any legislative progress in federal and state levels (Lazarus 2014). Indeed, according to a League of Conservation Voters scorecard, Democratic pro-environment voting rose from 1970 to 2017 from 50 to 94% whereas Republican voting decreased from 37 to 5%. (Lavelle 2020)

While federal action through unilateral executive orders, as seen in Obama's administration, can boost environmentalism, new administrative shifts like in Trump's 2016 election can reverse and rollback those actions. Additionally, action on climate change is becoming increasingly difficult, in part due to misinformation campaigns from utilities, corporations, and politicians. During Trump's presidency, he not only removed the U.S. from the Paris Climate Accords but allowed nearly 70 environmental rules and regulations to be officially reversed, revoked, or rolled back (Popovich et al., 2019). This blatant undoing of Obama's administration's rules in favor of business interests and unyielding profit affected individual states. Because states implement federal laws through their own state agencies, state laws must be at least as stringent as the federal government (Konisky 2017). For Republican dominated states like South Carolina, the federal rollback of environmental regulation served to ease state level regulations. However, in states controlled by Democratic majorities like Virginia, federal

action was transformed into partisan challenges to federal decisions by then exceeding those requirements.

Many states have developed their own climate action plans to reduce emissions and transition to a cleaner economy without the support or guide of the federal government. Environmental federalism at this scale and extent has resulted in 50 separate energy, transportation, climate adaptation, and environmental protection policies throughout the country. Reagan's new federalism era in the 1980s pushed environmental responsibilities down to states during the broader pattern of devolution (Konisky 2017). While this permits state authority, leadership, and freedom over its more local environmental concerns, states can be unable, unwilling, and even hostile to policy innovation (Konisky 2017). This results in greater polarization and a lack of coordination between states as reflected at a national scale even today with President Biden's administration's failure to pass climate focused legislation. While there is growing public acceptance and concern, especially from passionate youth groups, about the causes and effects of climate change, entrenched and gridlocked environmental politics in the U.S. may be the country's ultimate failure to solve climate change issues.

This evolution in environmental politics surrounding climate change has affected how the public, private sector, and politicians view various solutions. Because the energy sector is increasingly recognized for its harmful impacts on the environment, economy, and public health, solutions for renewable energy are rising to the top of political and even economic agendas. Fossil fueled energy has a high cost not fully realized by our electricity bill such as costs associated with fuel leaks or healthcare costs to remediate pollution harms (Greenstone 2011). Despite the current economic dominance of natural gas for electricity production, considerations for the social and environmental cost in comparison to renewables will help drive demand. Renewables are experiencing decreased costs in general due to technological innovation that is decreasing the upfront investment. Especially with developments in storage technology, there is growing scientific and economic evidence that 100% renewable is possible in the long term.

Cities are the primary focus of this paper because of the growing awareness of city's environmental impacts and their political roles in the United States and globally. While cities are often thought of as the antithesis of sustainable, recent years have reconceptualized cities as centers of sustainable economic activity and civic engagement. Even in the field of city planning, planners note the dramatic change over the last 50 years from a highly technical engineering focus on highways and suburbanization to more community-based sustainability focus. This paradigm shift has shaped the definition of sustainability from one strictly about resources and environment protection to a more intersectional definition focused on maintaining environmental health while supporting economic prosperity and social justice. Thus, cities represent the social, built, and biophysical systems within an urban environment. A more sustainable city focuses on both fostering diverse economic networks and committing to social equity goals in a way that ultimately reduces the city's carbon and ecological footprint (Talen, 2012). Because energy or electricity is a major source of pollution and consumption throughout a city, there are exciting opportunities for cities to take advantage of renewable energy developments. Since clean energy addresses greenhouse gas emission reduction, energy poverty, and economic savings, sustainable cities will transform into renewable energy landscapes in order to accomplish their climate action plans.

This paper examines the connections between climate change, energy policy, and local government in South Carolina and Virginia. These states are interesting examples of partisan effects on environmental policies, specifically around energy topics. In the Republican strong

South Carolina statehouse, discussion of climate change is taboo, with the common view that moves to alleviate climate change are standing in the way of economic opportunities with fossil fuels and status quo investments. At the same time, Republican principles of choice and freedom have opened up conversations about solar development, especially when the use of solar is tied increasing economic activity and jobs within the state. The 2020 Energy Freedom Act in SC marked a shift in political views towards clean energy advancements throughout the state, and subsequent scandals in the electricity industry have result in a greater focus on utility oversight.

In comparison to South Carolina, Virginia is more politically diverse state and experienced complete Democratic alignment in 2020, which set off a wave of clean energy policies. However, Dominion Energy, the major utility in the state, is entrenched in Virginia politics, and typically functions to hamper the full realization of Virginia's solar and wind potential. While both states are served by Dominion, the utility operates in two unique regulatory environments. Virginia is a so-called deregulated state, meaning it has some forms of wholesale competition, and is a member of the Regional Transmission Organization (RTO) called the PJM market. South Carolina remains traditionally regulated, meaning the Dominion operates as a vertically integrated monopoly in the state. However, both states have complicated energy landscapes within their complex and ever-changing political environments.

This thesis ultimately stems from my personal interests and experiences in geography-based research. From my energy policy and market research within the University of South Carolina Department of Geography, I found my initial passion for energy specific policy research and developments within the U.S. While my entire undergraduate experience has focused on sustainable development and climate change solutions, I have a specific focus within geography studies on urban environments. My fascination with the field of city planning encouraged me to explore local efforts to turn political aspirations into actual emission reductions. Likewise, my internships with Conservation Voters of South Carolina and the SC Energy Office provided me the hands-on experiences of state politics regarding clean energy. By interacting with clean energy politics on a state level and understanding those effects on local initiatives, I hoped to act upon my curiosity about this relationship and dynamic between the city and state, especially for capital cities. As a result of my research positions and internships, this thesis touches on diverse aspects of my undergraduate experience at the University of South Carolina in Columbia, SC.

Literature Review

Why cities?

Due to rapid urbanization and trends towards city development, cities are key spaces that exacerbate climate change. Because of the large populations of people in cities, urban environments are responsible for rising greenhouse gas emissions. By some estimates, cities contribute to about 75% of global emissions (Bulkeley 2010). More than just emitters, cities are also extremely vulnerable victims to climate change effects.

Cities are major hubs of infrastructure provision. They are sites of energy supply and management, transportation systems, water treatment, and waste management among others. Climate change puts these urban systems at risk. According to the International Panel on Climate Change 2020 Fifth Assessment, urban sectors such as energy and water are interconnected in the way they interact as well as the way that they will face climate stressors. For example, severe flooding and storms put water treatment plants at risk alongside the electricity grid that supplies it energy. Local issues, including street flooding, will continue to worsen as the climate warms.

Additionally, cities face a unique urban heat island phenomena as a result of rising temperatures that concentrate in highly paved and built environments. The impact of city heat then relates to stresses on other city systems, especially building energy consumption due to the rising demand for air-conditioning. Cities' intensive energy use on top of paved land surfaces results in a harmful generation of waste heat.

These urban areas of street flooding and urban heat are also interconnected with cities' historical legacies of racism and poverty. Remnants of city planning's redlining is still present in those disinvested neighborhoods and housing stock that face higher degrees of flooding and extreme heat incidents and vulnerability. Cities face interconnected issues, but also solutions when the reduction in poverty and reckoning of racial justice improving housing quality and investing in infrastructure and green space needs, then correlates to reducing the city's overall vulnerability to climate change. As cities invest in the expansion or improvement of their interconnected systems, they determine how they will deal with how they will contribute to the economic, social, and environmental devastation caused by climate change.

Many cities are politically poised and eager to implement ambitious policies that curb their emissions and combat climate change effects (Hallegatte 2008). As a result, urban governance of climate change has responded to shifts in state and federal based political authority (Bulkeley 2010). State and federal jurisdiction of climate change issues and effects have been rescaled by city leaders such that local networks of collective actors now self-govern in response to political stagnation at higher levels of government. In what has been coined 'eco-state restructuring', the emergence of the urban governance of climate change has reorganized state and federal regulation and political capacity. Not only are states responding to their frustrations with state and federal inaction, but there are clear trends in the devolution of political power to the local levels of government (Konisky, 2008).

In response to these changes, cities have pledged and implemented ambitious policies, becoming the site of governance experiments and demonstration projects designed to reduce greenhouse gas emissions. Cities are poised to take on this challenge because of previous experiences in coordinating partnerships and community involvement with local policies (Bulkeley, 2005). City focused policies deal residents' daily lives – the experiences of urban heat and flooding, for example – and local authorities have clear responsibility and duty to enact climate change focused policies. Local authorities are often more willing, confident, and able to undertake the sustainable development agenda in order to improve their community's livability standards in the future. Cities can lead by example, using municipal buildings to set precedents within their own communities as well as for those places outside of city limits. In general, the public desires government policies to match the geographic scale of the problem (Konisky, 2011). However, and perhaps more importantly, the choice of government level action matches political orientation and the general confidence in each level of government (Konisky, 2011).

Cities are strongly compelled to facilitate innovative policy programs because of both their politics and more progressive leadership. In general, American cities lean left politically, and oftentimes represent blue dots in larger red regions. Local elections and politics are technically nonpartisan and 'grey' in nature, as issues of zoning, trash collection, sewage, and other livability concern do not have an overwhelming partisan bias. However, climate change does, and cities are responding to determine their progressive politics and demonstrate their frustration with state and federal governance.

Why clean energy?

Although there are many city responses necessary to combat and adapt to climate change, cities' growing energy, or more specifically, electricity consumption must be addressed in order to drastically reduce greenhouse gas emissions. In the United States, the electricity sector alone accounts for 28% of greenhouse gas emissions (28%), with about 63% of electricity generation derived from burning of fossil fuels (EPA, 2020). The energy sector accounts for patterns of economic growth and land use due to the infrastructure and resources necessary to produce electricity. There is a strong correlation between economic development measured in GDP per capita and energy consumption, with wealthier places tending to use more energy than those that are poor.

While transitioning towards clean energy has clear environmental benefits, in recent years renewables have begun to have favorable economic impacts in comparison with fossil fuel sources (Aznar, 2015). With subsidies and the near zero marginal cost for renewable energy, conventional fossil fuel generation of electricity will not match environmental protection or economic savings goals (Borenstein, 2015). Cheaper renewable energy for cities also means economic savings in other connected sectors. Because cities often rely on electricity to power their dense building stock, urban transportation systems, electric vehicle charging stations, and water treatment plants, lower electricity prices with renewable energy could mean economic savings for other departments.

Additionally, clean energy developments are interconnected with social justice issues and goals. With increasing energy burdens in economically disadvantaged regions of cities, energy is increasingly connected to how city's address legacies of inequitable development tied to racism and poverty. Because the energy price and infrastructure have influenced patterns of urban development, concentrated regions of historically Black and economically vulnerable communities tend to have higher energy burdens than wealthier, predominately white neighborhoods (Bridge, 2013). Environmental racism is also tied to the fossil fuel industry as many fossil-fueled energy plants have historically polluted impoverished communities of color. Additionally, any action that curbs greenhouse gas emissions and mitigates the harms of climate change so too ameliorates vulnerable communities that are more detrimentally harmed by urban heat and flooding effects. By decreasing the urban heat island effect and building urban resilience against climate change, cities decrease vulnerabilities that are especially prevalent in already vulnerable communities. In short, cities are increasingly recognizing how sustainability-focused work develops into multiple synergies across city departments for environmental protection as well as economic viability and social justice.

What are cities' clean energy decisions and climate change policies?

In order to understand the current state of urban political geography and the clean energy transition, it is important to recognize the context of city action more broadly in addressing sustainable development and climate change mitigation. In 1988, the Toronto Conference on the Changing Atmosphere was a political catalyst within the international science community to address climate change, but to do so in a way that linked climate change to sustainable development (Bulkley, 2005). In the 1990s, international councils and alliances grew to address the local scale governance of climate action, including the formation of the International Council for Local Environmental Initiatives and the Cities for Climate Protection Network (Bulkley, 2005). This movement towards international collaboration on a city level preceded the Rio United Nations Conference on Environment and Development. In the United States, cities

specifically started creating their own greenhouse gas emission reduction goals and climate action plans.

In the broader U.S. political context, the 1990s represented a stagnation in advancing environmental policy. In the early 2000s, new generations of sustainability-focused city departments or mayor's initiatives ignited alongside a more grassroots network of urban leaders. For example, national municipal networks organized into the C40 Cities Climate Leadership Group, and some cities signed onto the U.S. Mayors Climate Protection Agreement (Bulkley, 2005). The 2007 U.N Conference featured local leaders from around the world, which then formed the Bali World Mayors and Local Government Climate Protection Agreement (Bulkley, 2005). In these first waves of municipal leadership on climate change, collaboration and networking were at the forefront at both national and global scales.

The most common city action has been the adoption of greenhouse gas reduction targets that are focused on the energy sector (Bulkley, 2005). In 2021, there are 34 states with a climate action plan and twenty-four with specific emission reductions goals (Center for Climate and Energy Solutions, 2021). This compares to over 180 cities that have 100% clean energy targets (Sierra Club, 2022). Within these emission reduction goals on energy consumption, cities pledge to meet targets for renewable energy, create energy efficiency incentives, and lead by example and education (Bulkley, 2005). Specific energy decisions revolve around these action plans, including conducting greenhouse gas inventories, tracking metrics, and creating updates of this plan. In order to procure clean energy, cities are focusing on distributed generation, which includes cities finding ways to incentivize, educate, and finance renewable generation to residents and businesses (Aznar, 2015). Between 2015 and 2020, U.S. cities procured 8.28 gigawatts of renewable energy through 335 energy deals (Gonçalves & Liu, 2020). However successful these on site, community, or off-site power purchase agreements were, this only represents 1% of electricity generating capacity installed in the U.S. (Gonçalves & Liu, 2020). Because of former President Trump's withdrawal from the Paris Agreement and the declining costs of clean energy projects, 2018 marked a major spike in renewable energy purchases (Gonçalves & Liu, 2020).

However, city clean energy actions are not likely to include intervention or advocacy due to the assumption that cities with franchise agreements with their incumbent utility have limited to no impact on energy decisions. Instead, cities' roles focus primarily on education and collecting energy related data and metrics either/both within municipality buildings or services and community wide (Aznar, 2015). Despite the ambitions of city policies to combat the climate crisis, there are important disadvantages of city level goals with growing gaps between rhetoric and action.

The effectiveness of city action has been called into question due to issues of institutional capacity, with many local governments not yet equipped with city staff that can handle the procedural and financial power to fulfill climate action plans. Even if cities had institutional capacity within their own staff and council, cities have had limited political economy to take on even city level reforms necessary to decarbonize their electricity grids (Bulkley, 2005). Since major reforms in the energy market in the 1990s, localities have been excluded from energy decisions. In cities without a municipal energy utility, local governments are oftentimes not stakeholders in engaging with their utilities or regulators about energy policies. This is increasingly important for new local renewable energy projects since over 90% of U.S. city's renewable energy purchasing was accomplished through off-site power purchase agreements (Gonçalves & Liu, 2020). This purchasing method is a form of retail electricity choice that

allows for cities to purchase energy from off-site utility scale projects. Additionally, off-site PPAs are usually made by localities with Community Choice Aggregation so that they aggregate their demand in bulk and use long term contracts (Gonçalves & Liu, 2020). None of these options exist for regulated, monopolized energy markets, so cities that do not have utility choice cannot as easily make these purchases and decisions. However, with the rise in interest for environmental based criteria for energy decisions, progressive and metropolitan local governments especially have used partisanship to make clean energy a politically nuanced agenda item (Bridge 2013). Nonetheless, cities are still far from conducting major reforms and wielding their power to implement their clean energy goals. The gaps between city pledges and actions continues to grow due to insufficient and stringent staff capacity, financial resources, and large-scale policy experience. Without the personnel and funding to support energy-related goals, cities cannot comprehensively turn words into actions (Aznar, 2015).

While cities face additional challenges. One is the continual question of how to grow and develop when confronted by the challenges of NIMBYism (not in my back yard), affordable housing, urban sprawl, and the tendency to make decisions in the short term to save money and attract more businesses. An additional challenge is posed by the rise of privatization and market-based solutions, in which cities become centers of economic competition between each other in order to attract a growing population of businesses, employees, and investors.

As a result, cities deal with a multi-faceted complication to their clean energy goals. While cities propose clean energy goals in order to combat climate change, they neglect to realize that reducing their carbon footprint may mean reducing city growth to a more sustainable rate. Clean energy goals and climate change initiatives may not follow their capital investment model, even though the initial upfront cost for such investments will transform into tremendous savings over time, especially as those upfront costs decrease. Clean energy technology and the savings from clean energy and energy efficiency poises cities to take advantage of their economic and political power to make an environmental impact. If cities plan for energy efficiency, sustainable resource and land use, and dense zoning, urban landscapes may become sites of climate change solutions instead of disasters.

While cities are increasingly emerging as major political actors in the clean energy transition and fight against climate change, there are key advantages of state and federal level decisions and actions worth recognizing. Because the causes and effects of climate change do not reside in a city or regional boundary, federal and state governments may be better equipped to manage large scale interstate spillovers (Konisky, 2008). The national and state agencies overseeing clean energy development may be able to better capture the economies of scale of the infrastructure and political developments necessary for the state and nation as a whole to undertake a major energy transition. In order to address the possible inefficiency and rigidity of national standards, state level control could account for state level differences and their unique situations without getting too overwhelmed and detailed with local level differences (Konisky, 2008). In the political race to the top, there is merit in raising standards and creating regulatory pressure by allowing states to experiment and innovate policies. This could also apply to local experimentation and competition between cities, but state authority has additional agency and access to the funding and scale necessary to undertake those policy changes and experiments.

While local leadership engages the public in a more participatory and responsive way to local environmental concerns, there is risk of disengagement if cities fall prey to making false promises that cannot be accomplished with limited institutional capacity to implement those goals. Likewise, a city's economic goals to continue its unrestrained growth may make the public

hostile to the upfront costs of innovation and adaptation to climate change. There are still overwhelming challenges for cities to understand and undertake once they adopt climate action plans and clean energy goals. In order to then address why some cities are ahead of others and how cities can progress, it is invaluable to first understand the city's context about how they got to their current clean energy goals.

Columbia and South Carolina Context

Following Barack Obama's federal funding towards city initiatives and pipelines of environmental projects, the City of Columbia funded their first full-time sustainability coordinator position and created a volunteer board called the Climate Protection Action Committee (CPAC). According to their bylaws, the purpose of CPAC is to recommend and oversee the development and implementation of the city's sustainability projects and programs while developing and advocating for strategies to lower emissions, adapt to climate change, and protect the city's environment. The years 2008 through 2010 also marked the city's use of federal grants to buy renewable energy credits to power their city. In June 2017, Mayor Steve Benjamin sponsored, and the City Council approved, a resolution that established a city-wide goal of transitioning to 100% clean energy by 2036. This future year would mark the city's 250th anniversary as a city. At this time, Mayor Benjamin became one of the four co-chairmen Sierra Club's Mayors for 100% Clean Energy campaign (Office of the Mayor, 2022). As a member of the US Conference of Mayors, he sponsored a clean energy resolution that reflected his own city's resolution. Mayor Benjamin approached the sustainability coordinator about the 100% goal, which had come as a surprise to. The mayor, council, and staff members accepted this challenge thereafter. Despite a stated goal around clean energy, CPAC and the sustainability coordinator's work was primarily oriented around waste and recycling. Even as concern for environment and climate action grew in response to Trump's environmental policy reversals, the city remained mostly inactive in response to stagnant state policies and utility support.

Despite these frustrations, the city continued to prioritize environmental concerns due to the severity of climate impacts. Outside of political motivations and effects, Columbia enacted climate-focused legislation in response to momentous and ongoing climate events. In 2015, Columbia endured the aftermath of Hurricane Juquin. This climate event destroyed the city's hydroelectric power plant, harmed the city's water infrastructure, and left vast portions of the city underwater. In one day, the Columbia Metro Airport recorded 6.7 inches of rain on October 4th, 2015, which surpassed the previous 1959 record (National Weather Service, 2015). The rainfall rate was about 2 inches per hour that devastated urban areas with higher runoff rates from impervious surfaces. This disaster was exacerbated by failing infrastructure such as dam failures and pipe washouts. Without proactive climate adaptation and event preparation measures, the city could only react afterwards by improving its stormwater management. The city is also infamous for its slogan "Famously Hot", which now is felt literally with its intensely hot and humid summers. According to a vulnerability and preparedness report by The Johns Hopkins Bloomberg School of Public Health and Trust for America's Health, South Carolina is tied with four states as the second most vulnerable to climate change and the second least prepared to address the public health effects (McKillop, 2020). Columbia's urban heat island effect is only exacerbated by the intensifying heat across the region that leads to heat related illnesses and deaths (Kahler, 2021). These major impacts from climate change will only worsen with the state's lacking preparedness and willingness to address long term sustainable solutions.

Like most of the Southeast, Columbia deals with growing energy burdens since they must rely on air conditioning to alleviate hot conditions. According to Move.org research on utility bills, South Carolina's average electricity bill is the 8th most expensive in the nation (8th) (Roberts, 2022). The state's energy poverty arises not because of high utility rates, but because of its climate, aging housing stock, and limited energy efficiency across the state (Byrd, 2020). As a result, state residents paid \$1735 for electricity in 2016 and the state had the 6th highest electricity consumption per customer (Byrd, 2020).

Dominion Energy is one of two investor-owned utilities in the state and holds a monopoly franchise to provide the city's electricity. While the company has pledged for carbon neutrality, its South Carolina generation is 75% fossil fueled as of 2019 (South Carolina Energy Office, 2020). In addition, South Carolina has a goal of only having 2% renewable energy by 2021, and nothing beyond (DSIRE, 2020). In 2014, the state adopted its first net metering legislation known as Act 236 or the Distributed Energy Resources program, which allowed for residential and small-scale solar producers to receive credit from excess power to the utility's grid (Quiroz, 2019).

Despite this limited push for clean energy policy, the state has increasingly targeted energy reform as a top agenda item as a result of the 2017 VC Summer Nuclear Plant crisis. After years of legislative approval and utility investment in nuclear plants, two of the state's utilities' (SCANA and Santee Cooper) abandoned the \$9 billion construction of the V.C. Summer twin-reactor project, which was only 40% completed (McLeod, 2017). This political and regulatory crisis called many utility decisions and legislative and Public Service Commission approvals into question. Because this greatly affected South Carolina ratepayers, legislators were highly motivated to seek energy regulatory reform. As of July 2020, a former utility executive plead guilty to taking more than \$1 billion in ratepayer and investor money. He also told investigators how the utility deceived regulators to approve rate increases at the expense of the local ratepayer (Collins, 2020)

The state's major progress towards energy reform that included major steps towards clean energy policy came with the 2019 Energy Freedom Act. Act 62 included utility customer rights and protections, solar net metering tariffs, neighborhood community solar, small solar power purchase agreements, voluntary renewable energy programs, and integrated resource plan requirements (Office of Regulatory Staff, 2022). The theme of this act was in competition, utility scrutiny and review, and protection of the electricity customer. The central principal for the Public Service Commission and the Office of Regulatory Staff became protecting the ratepayer and serving the public interest. While solar energy only accounted for 2% of the state's 2020 generation, all new generating capacity in 2020 (470 megawatts) is powered by solar (EIA, 2021). Additionally, legislators on both sides of the political spectrum are increasingly recognizing the economic arguments since the solar industry invested about \$2 billion in 2021 and thousands of jobs into the state (SEIA, 2021). Most recently, the state has continued its efforts to pursue energy reform by legislatively approving an energy market reform study committee to investigate energy competition (SEIA, 2021).

Despite these reforms, a South Carolina Solarize campaign found through surveys that residents are interested in their own or shared solar initiatives, but they have a high level of mistrust in utility decisions (Quiroz, 2019). This South Carolina energy policy context demonstrates that while the state has been realizing its potential for renewable energy and utility reform, there are major political changes still necessary to fulfill this potential and reap the benefits especially to ratepayers.

Richmond and Virginia Context

Richmond's move towards 100% clean energy started in a similar way to Columbia, with federal decisions enabling and motivating city action. In 2009, Richmond's city council established its Green City Commission to provide sustainability expertise to city council with consultation and collaboration with state government and other city departments (Zatcoff, 2021). Federal funding from the Obama administration helped the city to first realize its sustainability goals and work back in 2010. The city then developed and adopted its first sustainability plan in 2012 to focus on economic development, energy, environment, open space and land use and transportation. Virginia saw widespread collaboration in order to implement these federal policies such as in the creation of the Virginia Energy Efficiency Council in 2014 and Virginia Municipal League Green Government Challenge (Zatcoff, 2021). However, it was federal inaction and reversals that motivated Mayor Stoney's 2017 pledge to still fulfill the Paris Climate Accord goals through local initiatives. In 2019, the mayor made the city's climate action plan even more ambitious by pledging 100% instead of 80% emission reduction in order to reach net zero emissions by 2050.

These two moments set the city's sustainability office into motion with their climate action plan stakeholder and writing process, called RVA Green 2050. From 2017-2019, the city's sustainability staff built internal capacity, researched, and modeled its climate impacts and solutions, participated in racial equity training, and gathered internal and city-wide data to inform the rest of the planning process (RVA Green 2050, 2022). This process includes five working groups comprised of 125 citizens that are both stakeholder and community based. While everyday residents can become involved, the sustainability office also specifically recruited key partners from within the city, including business leaders, campus staff, non-profit leaders, and more. These working groups include a Racial Equity & Environmental Justice Roundtable and topical working groups (Buildings & Energy, Community, Environment, Transportation, and Waste), who all assist the sustainability office in determining strategies to accomplish their goals (RVA Green 2050, 2022). The city also received a grant for technical modeling and consulting, from Green Link, in order to understand their carbon footprint and craft goals that would achieve net zero by 2050. Through consultation, community input, stakeholder meetings, and city approval, the city has identified the following priorities: racial equity and env justice, government accountability, community wealth, housing and buildings, neighborhoods, health and well-being, engagement, and communication

RVA Green 2050 continues to be supported within the city through the planning department and council. Richmond's city planners adopted Richmond 300 in 2020 as the new master plan for the city to plan for growth over the next 20 years. This document incorporates sustainability through its discussion of equity, resiliency, environmental protection, and more. Because the city is currently experiencing population growth, city planners are assisting the city understand how it can use its current land in the most effective and efficient manner. City planners recognize that good planning policy is good climate policy. For example, Richmond's planning policies for solar installations have assisted the city's renewable energy goals, which led to its recognition as a SolSmart GOLD community for its efforts to make it faster, easier, and less expensive for residents to put solar on their homes and businesses (RVA, 2022). The city council continues its involvement with its original net zero ordinance by not only supporting the sustainability office in its mutual desire to be an example for sustainability cities in the Southeast, but also by reinvigorating city and public attention with new ordinances. The most recent 2021 climate emergency ordinance passed by Richmond's city council that set out twelve

ways for the city to continue its climate action and improve its path towards net zero. This stance also raised awareness about the seriousness of climate impacts on the city, including flooding and urban heat. Additionally, the Climate Equity Index within the RVA Green 2050, uses GIS mapping to identify frontline communities disproportionately affected by climate change (RVA Green 2050, 2022).

Similar to Columbia, Richmond experiences devastating flooding from extreme precipitation events on a recurring basis. Richmond, like most of the state, has already aging infrastructure that was not meant to withstand such extreme events. This leads to Richmond's agenda and funding prioritization of stormwater system maintenance and repair as the city struggles with such frequent inundation (Vogelsong, 2021). These events disproportionately impacted low income and minority communities who have been historically forced into worse housing situations at lower elevation. According to the work of a southside district organization called ReLeaf, historic and current inequities in infrastructure investments has meant that low income and minority communities are the most at risk (Lee, 2021).

The entire city faces extended heat waves and more extreme temperatures that will impact their own public health, property, services, and budget (RVA, 2022). However, the city has also realized how its redlining legacy has led to extreme urban heat effects in these same communities. Local university research by Dr. Jeremy Hoffman literally maps out how the pattern of higher surface temperatures matches formally redlined neighborhoods. Due to historical housing policies in Richmond, current heat events disproportionately expose and impact low income and communities of color (Shandas et al., 2019). This 'lived experience' of climate change has a huge impact on these households' energy use to keep cool (Hoffman, 2020). A 5-6 degrees Fahrenheit difference in these neighborhoods explains why energy burdens are so high for already vulnerable communities.

Because Virginia has increasingly become a more purple-blue state, especially with growing city populations and its proximity to Washington D.C., the state politics have transformed its clean energy transition. Under the former Governor Northam administration, the Democratic aligned state in the House and senate welcomed a sweeping victory of different energy focused policies and goals. In 2019, Executive Order 43 signaled major changes in the state's energy landscape moving forward. Then in 2020, the Clean Economy Act codified these policies with the introduction of a state mandated renewable portfolio standard and energy efficiency resource standard targets. These standards focused on solar and offshore wind, while also included equity provisions that would ensure a just energy transition, especially for former fossil fuel workers. The state's entrance into the Regional Greenhouse Gas Initiative was also a signal for equity since the money raised in this regional program would be carved out for low-income energy efficiency programs. In the state's third auction with RGI, the state raised \$43 million in revenue that would be 50% for low-income energy efficiency and 40% for resiliency projects (Vogelsong, March 2021). Additionally, state agencies worked on an environmental justice council in order to analyze impacts to historically economically disadvantaged communities. This statewide signal was symbolically felt even in the name change for the former Department of Mines, Minerals, and Energy, which is now the Virginia Department of Energy or Virginia Energy.

Dominion's response included a recent request for proposals for utility scale renewable energy projects, community solar, and small-scale solar projects (Dominion Energy, 2021). Upon completion, these projects have the potential to power 2 million homes at peak output, which is a major step towards accomplishing the state and utility-scale net zero goals (Dominion

Energy, 2021). From a local perspective, the utility's request for proposals has also included guidance for cooperation with local governments. Despite this demonstration of compliance and progress, the state must still reckon with utility entrenchment in Virginian politics. The utility serves about 5 million of 8.5 million residents and a major contributor and influence within the Commonwealth for both parties (Dominion Energy 2021). Only most recently in 2021, Dominion came under scrutiny by the State Corporation Commission for the first review of its rates and earnings in six years. This controversy arose due to over \$1 billion in excess profits that they tried to recover from retiring coal plants early (Vogelsong, Oct 2021). As a result of this review, customers received \$330 million in refunds and \$50 million reduction in rates for the future (Vogelsong, Oct 2021). While Dominion continues its role as a major donor and stakeholder within the legislative process, the state's policies and regulations have noted a shift in this traditional relationship that will bring more scrutiny and demand.

This state and utility leadership was not merely a symbolic shift in policy, but a tangible set of changes and actions. The statewide goal matched Richmond's emission and clean energy goal of achieving 100% carbon free electricity by 2045. The Virginia Clean Economy Act has been the state's largest piece of energy legislation that became an enormous lift for agencies and localities alike to then implement clean energy goals together.

Given this overview of the context in Columbia and Richmond, I seek to answer the following research questions:

- What were the critical motivations for local action on clean energy in these two cities?
- How is the City of Columbia and Richmond planning to meet their 100% renewable energy goal?
- What were the key differences between Richmond's and Columbia's processes to meet their renewable energy or emission reduction goals?
- Do these plans consider issues of equity and justice?
- What power do electric utilities exert within political and economic spheres in these cities and then states more generally?
- What effect does market regulation and state legislation have in the utility's movement towards clean energy?

Methodology

Literature Review, Background Research

I began my research with a literature review to better understand historical and emerging efforts by cities to combat climate change by promoting and transitioning towards clean energy. I collected a diverse array of scholarly articles and case studies about clean energy politics and city level decarbonization efforts. I utilized the University of South Carolina's online database and Google Scholar to find these reports. Additionally, my research mentors and connections in the clean energy policy field provided me with guidance and resources for my literature review. I collected key quotes and annotated these papers in order to analyze and synthesize all of the relevant information. I thematically organized these notes and used them to develop my research questions. Much of this information is contained in literature review.

After investigating the climate change mitigation efforts of cities more broadly, I delved into relevant articles and online resources detailing the efforts in the City of Columbia and Richmond. I reviewed both cities' climate action plans and comprehensive planning documents.

I drew on local and state newspaper articles to discover relevant coverage of each city's climate change experiences and clean energy or environmental politics. I reviewed each city's website for online materials to learn more about its city staff and political structure and discovered available information about each city's historical environmental protection efforts (including their environmental volunteer commissions). By reviewing each city's website for background information, I also collected contacts for interviews with city staff, politicians, and volunteers. My initial methods for collecting and reviewing background research and city specific information assisted the subsequent interview process.

Interviews

Once I had conducted sufficient background research, I collected contact information for the interview process. I found most of the contact information on government and organization websites. If I could not find their contact information online, I networked with other interviewees or known contacts to determine the interviewees' email. I emailed each representative with a formal invitation that introduced the subject of my research and outlined the parameters of the interview. When they accepted my request, we decided on a time to meet virtually through zoom or a phone call.

I was successful in interviewing 45 people, representing a range of stakeholders: members of city councils, the mayor's office, and city staff in the departments of planning, sustainability, and public works. For a clean energy advocacy perspective, I interviewed representatives from statewide environmental policy non-governmental organizations, including Conservation Voters of South Carolina (SC), Sierra Club SC, and Coastal Conservation League from South Carolina and Sierra Club Virginia (VA), VA Clean Energy, Green New Deal VA, and Extinction Rebellion VA from Virginia. Additionally, I interviewed individuals from interstate organizations such as the Southeastern Sustainability Director Network, Southeast Energy Efficiency Alliance, and the Urban Sustainability Directors Network. I also collected state agency contacts so that I could discover state-specific perspectives from each state's energy offices and environmental protection agencies. Because both cities are served by Dominion Energy, I also contacted the utility's government affairs representative. Due to my previous experiences and connections at the University of South Carolina, I did not interview their Office of Sustainability representatives. However, I did interview sustainability representatives from the University of Richmond and the Virginia Commonwealth University in order to understand Richmond's major stakeholders and partners.

I prepared for each of these interviews by creating a standard outline of questions. Once I finalized a list of prepared questions, I organized these according to theme and how I would conduct the interview. However, after a few of my first interviews, I realized that I would ask this outline of questions according to how they naturally arose from the interviewees' responses. I kept track of how I would continue to the next question by writing notes continually throughout the interview. I also took notes in order to draw out the key themes. This process helped me connect recurring ideas across all the interviews. It also inspired new ideas for research in order to answer new questions or investigate more about a specific event or idea. Each of these interviews were conducted via zoom except a few phone calls when a zoom call was not possible. I recorded these meetings with their permission, so that I could transcribe the audio into written text. This also allowed me to review the audio in the future if I needed to review a specific quote. Once I concluded the interview, I followed up with the contact to thank them for their time as well as follow up with any remaining questions or ideas that we had shared.

Transcript Annotations and Dedoose Coding

At the conclusion of my interview process, my research mentor used Rev.com to roughly transcribe each audio recording into a word document. For a review of my interviews, I reread each transcript. During this process, I highlighted and bolded key quotes that fell into themes and central ideas. As I noted each recurring comment or unique quote, I took notes in a separate document about my ideas and questions as they developed. This then became a central outline for the thematically organized key findings. I used Dedoose, a qualitative analysis software package, to code each bolded text under the outline of themes. By reviewing the transcripts once more with Dedoose, I started to organize the themes more concisely and make connections across all of the interviews. The coding process also allowed me to compare and contrast between my interviews from Richmond and Columbia.

Columbia Specific Ethnography: Observation

In addition to my interviews, and due to my proximity as a student in Columbia, SC as well as my connections to sustainability networks in the city, I became involved as both a non-participant and participant observer to my research as it developed. At the time of my interviews, I was an intern for the South Carolina Energy Office, which had frequent participation in Columbia's Climate Protection Action Committee public and advisory meetings. I maintained distance between my research and professional commitments by refraining from disclosing opinions or interview comments during these meetings. Likewise, I ensured that my interviewees knew that this work was on the behalf of my honors thesis and the University's Department of Geography research and not the intent or work of the agency.

However, my interconnected roles played a part in how I observed the functions and effectiveness of the city's work. For example, I learned more about the city's limited external collaboration from my firsthand experiences communicating to the city in this role. Additionally, I developed personal opinions about the effectiveness of the city's climate or clean energy forward actions because of the frustrations iterated at these public meetings. While I was not an active participant at meetings between outside organizations or agencies and the city's sustainability committee, I was able to observe the limitations of city and statewide collaboration. I also learned more about the developments and functions of the volunteer environmental committee as it occurred in real time outside of my interviews.

Participant observation allowed me to develop my questions or ideas more deeply through my first and secondhand experiences. While this involvement in my research may present limitations as a biased researcher, this process allowed me to build a rapport with my interviewees and target audience. Both in my interviews and the communication thereafter, my interactions with this group became more established and casual. This allowed me to become more integrated into the city and state environment as a researcher instead of creating strict separation between my research and professional work. Since I did not have the same connections in Richmond, I was unable to build the similar type of rapport and observation, which then limits my comparison. However, sustainability connections are inherently interconnected in what is already a small field of study and work. Thus, I still worked under the same approach of intersectionality and networking in order to build a network of interviewee contacts and then understand their own city and state environment. Overall, the power of networking whether near or far proved effective in forming central themes from two distant cities with similar underlying themes and experiences.

Communication to interviewees and presentation of research

Upon processing the interviews and drawing out the key findings, I worked outside of my honors thesis to communicate this research to the interviewees themselves. I sent the final draft of my thesis to each of my interviewees, so that I could possibly spark or reignite connections, conversations, and future collaboration. Because one of the most important findings includes the importance of relationship building and collaboration, it was my goal that by sharing my research, I could watch my research findings become new actions that each city takes to advance their sustainability efforts.

Likewise, while writing what would become this final draft of my thesis, I wrote two white papers for each city. These concise papers focused on key findings and recommendations for both cities as they continue their internal and external sustainability and clean energy focused work. Additionally, I set up a city-specific virtual meeting with council members, staff, and the volunteer commission, most of whom had been interviewed, in order to present these white paper's findings and engage in dialogue about the results and their opinions or questions thereafter. Thus, the paper resulted in engagement and collaboration in hopes that it inspired new and continued passion for their work. This research resource was city specific, but also broad enough for it to become a source for ideas for other cities. As a result, I presented this paper to the Urban Sustainability Directors Network and the Southeastern Sustainability Directors Network. Therefore, the thesis and two white papers developed into a resource for future city staff and environmental leaders and researchers.

Challenges and Limitations of Methodology

Despite fulfilling my research goals, there remain challenges and limitations to my methodological approach and research outcomes. Firstly, I conducted this research under a limited timeframe. I only captured at most a decade's worth of experiences and firsthand knowledge from the interviewee's careers. By the time I finished with my interviews, I would not be able to collect opinions and news after that process. This was specifically limited for the City of Columbia, which has had a mayoral election that has uncertain effects on the city's leadership and actions to address climate change. Additionally, I conducted interviews right before Virginia's state governorship change, a change that has since also affected Virginia's clean energy politics. However, most interviewees were well informed on the longer and most recent history of energy and environmental policy at multiple governing levels in the United States.

The scope of the interviews is restricted to the specific timeframe of my interview process. Likewise, each interviewee's answers are limited by time within the interview itself, as interviewees may feel pressured by their schedules or their ability to answer broadly or with many details. Depending on my own or the interviewees' work or personal schedules, some interviews were constrained by time to expand upon their answers. This meant that some interviews were more rushed than others. Despite this limitation, the expertise and interconnected experiences of the interviewees still provided much depth and breadth necessary to construct a comprehensive narrative.

I was also challenged in recruiting all the interviewees that initially I had desired. I was not successful in confirming some key perspectives that I hoped to include. During the entire outreach process, I was unable to confirm state legislative interviews. Likewise, it was difficult to connect with state agency leadership that seemed nervous to share direct opinions on clean

energy matters. Even city level contacts were difficult to attain due to limited bandwidth or scheduling conflicts. While I completed a comprehensive interview process, I did not have as many senior leadership perspectives in comparison to non-profit advocates and lower staff positions. Therefore, I did not cover as many positions or fields of study and work as I initially hoped.

Even though I gained crucial observations and personal experiences in my role as an intern at the South Carolina Energy Office, I was limited in my involvement at the time in order to avoid a conflict of interest in my research. I did not share my personal opinions during interview processes and while sharing research outcomes. Even when I was no longer in this professional role, when interviewing Richmond contacts and sharing the research outcomes, I did not disclose my own opinions and solely relied on the perspectives of the interviewees and the literature review beforehand. I could have made more lasting impacts and built stronger rapport with the interviewee groups, especially at the city level, had I become more involved as a leader myself in their work.

Themes

Following the interview process, I organized responses into the following themes of discussion: why cities pledge, challenges, and opportunities. These themes are ordered according to the succession of questions during each interview. I organized these themes further into subcategories that represent the main ideas provided in each response. I have outlined general notes and specific examples in the context of the cities of Columbia and Richmond and both states, South Carolina, and Virginia. I noted the origin of specific ideas and events according to the table below. The 45 interviewees are cited according to their category. This section delves into the thematic analysis of my research questions as a result of my interview process.

Interview Reference by Category
City Volunteers
City Employees
City Politicians
Non-Profit Employees
Utility Representative
University Staff
State Government Employees

Why cities pledge

I initiated each interview with a series of questions related to why cities were addressing climate change. I hoped to draw out their own knowledge and opinions related to what specific or general reasons that their city and cities across the nation would be making 100% clean energy pledges and committing to climate action plans. These initial answers were often interconnected as they addressed environmental reasons, political motivations, and social justice concerns. Interviewees recalled city specific experiences and events as well as national trends in the politics of climate change. As a result of this initial set of background questions, I formed the first set of themes under city action that includes, climate change vulnerability, political leadership, and intersectionality with social justice concerns.

Climate change vulnerability

As a result of a warming climate in the southeast, cities are feeling the impacts of climate change daily. Thus, both Columbia and Richmond interviewees cited concerns about heat and flooding. When asked about why cities are addressing climate change, every interviewee from both cities acknowledged local environmental impacts. For Columbia, the 2015-hundred-year flood is still a very present memory in the minds of politicians and residents alike. As one informant to me, climate action is reactionary to what is occurring around them as seen with both state's impacts from local hurricanes (City Employee). Likewise, both cities understand the devastating effects of infrastructure collapses within their wastewater or stormwater runoff treatment facilities due to heavy flooding. Since both geographic areas are susceptible to flooding and increased risks from intense storms, these city level conservations are in reaction to these environmental elements of climate change.

Additionally, Columbia has a negative nickname as a “famously hot” city due to its intense urban heat that offers little relief. Similarly, Richmond suffers from intense heat events from the urban heat island effect as mapped by Dr. Hoffman. These visible indicators of climate change have prompted adaptation efforts to lessen their harm, such as expanded green space for both cooling effects and natural storm water drainage. Likewise, interviewees cited flooding and urban heat as motivations and priorities for city level action. As stated by a Richland, SC county planner, “people don’t think about it until it’s happening or that thing happens to me.” Both Columbia and Richmond are in this reactionary mode to address climate change as it is affecting their citizen’s standard of life. Climate change is on a city’s agenda because the purpose of local government is to protect life, health, safety, and welfare as stated by a Virginia city planner. As a result, resiliency is a key concern that is interconnected to city level energy decisions.

Political Leadership

While it is not the case for all cities across the country, the majority of cities respond to state and national politics when pushing for climate action. As a result of political polarization and partisanship over climate change and clean energy, Democratic cities have emerged as political leaders in response to frustration with Republican-led policies at state and federal levels. City leaders and staff in Columbia and Richmond specifically noted 2016 as a true turning point when President Trump’s decided to leave the Paris Climate Agreement. This global action trickled down to city leadership as U.S. mayors across the nation felt unified more than ever to stray from federal opinion and policy. Thus, city leaders not only felt a strong urgency to lead, but also, they understood the opportunity to demonstrate their leadership and political will to stray from major political paths.

For both Richmond and Columbia, there are clear political intentions underneath their clean energy goals and climate action plans. Both Mayor Benjamin in Columbia and Stoney in Richmond noticed the opportunity for local leadership in response to a federal and global action. Interviewees echoed this notion of thinking globally yet acting locally as a key motivating approach to overcome the roadblocks at a state, national, and global level (City Employee). This is especially true with energy decisions since there are 50 different energy policies in the absence of a federal energy policy (Non-Profit Employee). Therefore, cities took it upon themselves to start making decisions for themselves to fill this gap of state and national action and fulfill their duty.

However, the aftermath of these pledges had contrasting effects and follow up actions. For instance, in Columbia city staff and stakeholders in general were initially left out of the city

ordinance process only to become involved later with the actual task-setting process to accomplish those goals. Columbia's mayor at the time delegated this ambitious goal to its only sustainability staff member with volunteer-based support from CPAC. This demonstrated a lack of commitment and the largely symbolic gesture that this resolution meant for their political careers. City staff accepted this challenge with admiration and optimism, but also with limited guidance on how to initiate and measure those changes.

In contrast, Richmond has found more collaborative ways for city resolutions to translate into more meaningful action. Richmond's mayor worked in unison with the office, Green City Commission, and the city council as a whole in order to turn these resolutions into what became an ongoing stakeholder process known as RVA Green 2050. In December 2020, the city council voted in favor of the new climate-oriented master plan that set the stage for passing a climate emergency resolution. By having the city's green commission work closely with city council on this city resolution and collaborating on a climate and energy connected city master plan, Richmond's collaboration led to integrated goals and tasks instead of siloed plans and empty pledges. Even state level representatives in Virginia noted that Richmond's leadership and support have had a huge role in the direction that the state is going overall (State Government). Another informant noted that Richmond's Mayor Stoney has had an obvious push for social equity, sustainability, and climate change issues which has matched the overall trend of cities in general that are trying to move the ball forward (City Employee). While there could always be more funding and staffing tied to these ambitious resolutions, the leadership and follow-through of the city politicians in leadership can alter how these plans are adopted and implemented successfully or not.

It is important to note that when interviewees cited political motivations for climate action, they also hinted towards the underlying skepticism of their leaderships' active rhetoric, yet passive action. Despite the opportunity for grand political leadership for cities to act as policy experiments for climate mitigation, motivations for power, voice, and attention within the political sphere of climate change interrupted the comprehensive stakeholder process and planning needed to accomplish those goals. As interviewees echoed their opinion of the political motivations and implications for local mayors and council members, this reflects the Konisky's academic perspective that local politicians are using their progressive status to move the needle in their favor at a state and federal level. This form of nonpartisan local leadership may help broaden public support around these climate solutions and policies and encourage state and federal representatives to think more locally. However, this may create tension and further polarization if cities continually push back against state and federal directives. Thus, as cities set climate action goals, they often do so without fully realizing that these goals are well beyond their political reach and capacity.

Clean Energy Solutions and Opportunities

It is notable that prior to 2016, both city sustainability offices were overly concerned with issues of waste and recycling. However, once climate change came to the forefront of their agendas, so too came clean energy solutions. While cities spearheaded 100% clean energy pledges, they also found tremendous opportunities in the emerging developments of clean energy technology and policy. Due to the lowering costs, emerging production, storage technologies, and increasing community interest in renewable energy, cities have developed an active interest in clean energy as a way forward.

For Republican-oriented areas, the economic benefits of solutions drive these policies forward. Since solar and wind was bringing business, economic development, and tax revenue opportunities to the state's communities, climate focused policies were very involved on energy. According to Virginia state government representatives, the focus has been all about the connection between energy and jobs. By supporting the clean energy industry, Virginia sees this as the largest wealth creation opportunity in a general to drive economic growth in the 21st century (State Government Employee). Sustainability office staff agrees that economic development will also translate into local energy bill savings that then benefits the local taxpayer. While decreasing their city carbon footprint, cities see business and savings opportunities as key to their clean energy goals (City Employee). Likewise, cities are motivated to attract and retain profitable businesses such as Microsoft in Virginia, which has their own green energy goals.

Because it is cheaper to build and operate a solar plant than to continue coal plant operation, the future of energy from an economic and technological perspective is moving towards renewables, especially solar and wind for the southeast. Thus, politics are matching this trend by supporting these changes while also addressing their climate change concerns. Due to clean energy opportunities, 100% pledges were spearheaded by cities hoping to attract political, economic, and social interest and concerns. Clean energy seemed like the perfect area of sustainability work that could reduce greenhouse gas emissions, support their equity goals with more affordable housing and energy options, and lead to city savings and economic investments (City Employee).

These opinions reflect the academic perspectives on why clean energy is an attractive solution for a city's climate action plan. When noting the environmental, social, and economic perspective of clean energy in comparison to fossil fuels, it was clear that cities are increasingly paying attention to their own energy sector and how it relates to other sectors as well as within their own state and national grid. However, it is interesting that the focus of these resolutions during this 2017 timeframe focused on energy. According to the literature review, this timeframe does not line up with South Carolina or Virginia major policy changes to advance renewables. It was not until the 2019-2020 major shifts in both states that these 100% renewable goals could more quickly and effectively be realized. This begs the question of whether these resolutions were purely political and symbolic in nature with limited economic and political support otherwise.

Intersectionality with social justice

Cities have simultaneously sought to reckon with historical and recent racial injustices and lower income disparities while addressing climate change. Due to the connections between climate change vulnerability, housing or energy efficiency status, and a community demographics, cities have taken advantage of this overlap to combat multiple issues with comprehensive policies and planning strategies. Cities can rectify climate and environmental injustices and racism by considering community level energy poverty and redlining.

When asked about their ideas about energy justice, interviewees cited high levels of energy burden within their localities and within their state in general. A household has an energy burden or deals with energy poverty if a significant amount (usually 6%) of their salary pays for their electricity bill. In Columbia and Richmond, there are high concentrations of energy burdens due to energy inefficient housing stock. According to energy burden mapping, these households are predominately located in lower income communities with mostly African American

residents. These already disinvested communities are at higher risk of not being able to afford energy to run electricity and cool their homes. Because of race and class-based investment schemes and mapping, vulnerable communities face high energy burdens.

Energy inefficient housing stock is specifically located in communities of color and low income due to the legacy of redlining. Many interviewees cited their own city's history of marking minority communities and impoverished neighborhoods with little value and need for investment. Therefore, affordable housing meant energy inefficiency as well as reduced street repairs and green space improvements. According to Richmond's mapping, city planners now recognize that African American neighborhoods have significantly less green space than white and wealthier neighborhoods. Without accessible green space and its natural cooling effects, residents deal with higher urban heat threats. Additionally, these communities are more vulnerable to storm water or day flooding because redlining meant that the city invested less in equal drainage maintenance. As a result, Richmond has made a clear distinction within their stakeholder process to incorporate theories and strategies towards environmental justice. Unlike Columbia's unknown environmental racism agenda, Richmond has chosen to be upfront about their past while also incorporating equity within the planning process.

Richmond and Columbia recognize energy justice as a growing and significant issue, but mostly to promote individual ways to reduce energy consumption. For the city's own energy burden, city leaders and staff were less interested in energy efficiency goals than clean energy goals. They responded with uncertainty to whether they had the political ability and will at local and state levels to advocate for electricity rate changes or energy efficiency investments from the utility. Both cities expressed concerns about their own energy burden due to their old and inefficient housing stock and infrastructure. Additionally, these cities are home to large consumers of energy such as their university campuses within the city. This energy burden at a residential and city scale reduces the remaining capital available to pay for energy efficient renovations. As a result of high energy burdens and limited funding for energy improvements, city owned buildings and city housing continue to consume more energy while also contributing to rising greenhouse gas emissions.

For Richmond and Virginia as a whole, their aging housing stock presented an opportunity to invest in energy efficiency and solar. Richmond has tax abatements for low-income household energy efficiency improvements (City Politician). Additionally, the state government ensures that all citizens have access to clean and affordable energy through a shared solar program that has a low income carve out of 30% of program participants. This means that 30% of the program must be subscribed by low-income participants for the program to expand to a larger size cap (State Government Employee). These examples support local, and state administrative priorities based in equity and resiliency (City Employee).

By recognizing that both energy and the climate emergency is unjust and has connections to systemic racism, Richmond has chosen to address these legacies by investing in formally redlined neighborhoods (City Employee). As the city planning field in general begins to address its racist disinvestment in redlined neighborhoods, Richmond city planners and nonprofit leaders are leading research and action around increasing green space and clean energy opportunities in these spaces (City Employee and 4). Since these red lined neighborhoods are also sites of urban heat islands, Richmond city planners are addressing the inequity in green space and tree canopy that serves as natural cooling and air filtration (Non-Profit Employee). As a result, Richmond's clean energy goals are connected to its racial equity and reparation goals.

Columbia planners also recognize the historical racism of the field and practice that is being rectified now (City Employee). Since South Carolina is noted as having the highest electricity bills and highest cases of energy burden, clean energy and efficiency goals have been linked to their environmental justice efforts. Energy poverty means that they cannot afford their electricity bill or at least 6% of their income goes to energy, because of aging and disinvested housing stock (Non-Profit Employee). The city and state have a large base of older and manufactured homes means that energy efficiency. Thus, the steps the city takes towards renewables means that Columbia can address larger issues of energy justice.

Challenges for city accomplishments

The next set of interview questions delved into the challenges that cities face when attempting to accomplish their clean energy goals. Major issues relate to issues that each city cannot necessarily control or advocate to change. This includes the partisanship of state or federal politics that may favor or challenge the state's ability to promote clean energy. When the overarching state or federal policy hampers clean energy investments and developments, cities will struggle to advocate for larger policy changes necessary for them to accomplish their own clean energy agenda. However, city's more ambitious climate policies can demonstrate what is possible at a larger level and promote upward change.

Regardless, the overarching energy market structure within their state or region will affect how a city can actually make energy decisions. This means that whether the utility is vertically integrated as an investor-owned utility or acts within a monopolized market as a regional transmission organization impacts its capacity to make changes. However, there are several pivotal factors within a city's control that enable or hamper their ability to enact clean energy initiatives. Cities are challenged by their own internal operations, including their level of collaboration, communication, coordination, and partisanship. Even if the politics of climate action is not red or blue at a city level, cities struggle to prioritize these more proactive and comprehensive actions over the more mundane responsibilities of cities to deal with issues of livability on a daily basis. For a city to shift focus from waste and recycling to clean energy procurement requires extensive and inclusive coordination within the entire city to combat damaging work siloes. Likewise, these siloes are challenges from an external perspective if cities do not partner with outside agencies, organizations, or politicians.

Local, State, and Federal Politics and Partisanship

A major challenge for fulfilling city level pledges for clean energy includes the larger policies or priorities that dictate energy decisions outside of city control. Despite city leadership and the opportunities of clean energy, the Southeast in general has a lot of remaining changes to make to support an equitable clean energy transition. In broad terms, this translates to more Democratic political support for clean energy policy in comparison to Republican leadership.

Virginia's shifting politics over time on energy exemplifies the forces of partisanship. The assumption of pro-environment Democrats over Republicans continues to exist quite strongly especially considering Virginia's politics and oil/gas industry influence. From my interviews with state government officials, I noticed that optimism for clean energy progress depended upon Democratic leadership in the governor's office and statehouse. Despite the large wave of Democratic led legislation such as the Virginia Clean Economy Act, state and city staff were still worried about the fate of these policies if Republicans were in power (State Government Employee). State level optimism about a clean energy future also noted the

importance of Democratic federal control that would facilitate increased financial and policy investments in clean energy (State Government Employee). There was a lurking fear at this time before the governor elections that the state's clean energy progress could all be reversed with a shift in administrative policies and priorities (State Government Employee).

Regardless of these looming anxieties, there were already political tensions, even within Virginia's Democratic party itself. Advocates for a Virginian green new deal noted that generation gaps and dark money politics from utilities still impede and slow the state's progress (Non-Profit Employee). Even with growing consensus about climate change effects and clean energy solutions, there are still arguments even within the same political party about the speed and extent in which the state should move forward to pass and implement comprehensive energy reform (Non-Profit Employee). There are still critiques of the monumental Clean Economy Act that it still permitted new fossil fuel projects and protected utility interests (Non-Profit Employee).

Although Richmond is well supported with effective clean energy policy, there are remaining challenges for what a commonwealth city is allowed to accomplish. Virginia is a Dillon's rule state, which means that cities are only allowed to do what is enacted in state law or code (City Employee). This means that cities cannot make changes to rules such as zoning and planning permits that could affect their progress on solar panel siting (City Employee). As a result, Richmond has limited political autonomy and truly depends on partisanship for the passage and implementation of state level policies for clean energy.

While local leaders and even CPAC members have been outspoken by pushing for clean energy advancements and climate action, South Carolina politics around climate change greatly impedes clean energy policy. With the lack of statewide leadership for renewable energy, there has been limited widespread support for energy reform and clean energy investments (City Politician). Columbia's stance in contrast to a Republican federal government did not strike a positive chord with a Republican statehouse. Consequently, the statehouse did not support or even respond to SC city declarations for clean energy, even for the capital city (City Politician). There is widespread pessimism from a political perspective for clean energy advancements through public policy. Even if there is a bill that supports renewables, energy efficiency, or market reform, the city staff is more hesitant to over speak (City Employee). Because the clean energy pledge had connotations of political aspirations for Democratic party leadership, city staff assumed an apolitical stance to maintain that nonpartisan nature of cities (City Employee). This has created a non-interventionist and inactive political culture at the city level for Columbia. Even if the city's lobbyist was to become more vocal, this person is going up against state policy and utility political influence. For Dominion, they are forced to propose clean energy solutions under Virginia's state policy. In contrast, Dominion in South Carolina has no political directive or incentive to consider Columbia's demands. Therefore, the city faces difficult political challenges that overwhelm their seemingly futile city ordinances and pledges.

Because these city level pledges are usually mayor and council-led, leadership shifts through election cycles will disrupt progress and priorities. The same mayor or council member that enacted the clean energy pledge or climate emergency ordinance may only hold that position and wield that power for at most 10 years. Additionally, professional turnover is consistent within city staff, organizations, and state agencies. Some of my interviewees previously held the role I wanted a perspective from, or some have already moved on to other professional opportunities. Managing climate change effects at a sustainable rate becomes even more

challenging with shifts in leadership from year to year from a professional and political standpoint (City Employee).

As noted in the challenge regarding partisanship, the assumption remains that the solution for climate action is to elect Democrats (State Government Employee). This is both a polarizing issue for climate action at large in the U.S., but also a growing worry when Republicans are elected instead. This was an especially apparent concern for my interviews with Virginians who were then awaiting election day of their new governor. Despite some optimism that even Republican leadership could not completely overturn such comprehensive pieces of legislation, worries remained that the state had not yet met a point of no return (State Government Employee).

From the context of both cities and their respective state governments, this challenge is an overwhelming contrast between each locality and state approach to advance renewables. As noted in the literature review, local leadership still depends on the overarching policies enacted in each state and then the available federal support and funding. For Columbia, local staff and politicians are challenged to overcome limited clean energy policy and funding from the South Carolina statehouse. In contrast, Virginia's Commonwealth has a matching statewide goal with Richmond's own carbon neutrality and emission reduction goal. Likewise, Columbia has less agency and negotiating power to determine their own energy decisions without any form of electricity competition within the state and less support for renewable advancements from Dominion in South Carolina. Even if Dominion Virginia did not have statewide directives to develop renewable projects, Richmond has the energy market advantage to experiment with a different forms of partial electricity competitions, such as with community choice aggregation or an agreement with PJM. Even on a local level, the mayor's leadership shifts in priorities and funding can translate to the staff's overall ability to accomplish their resolutions. Politics and partisanship could be the utmost challenge and determination of success, especially for blue cities within deep red states.

Technical Energy Policies and Markets

While there are opportunities for clean energy advancements and policy reform, these solutions are extremely complex and technical. As a result, changes to existing energy decisions are more difficult for city level politicians and staff and exclusive to the public. As noted in the aforementioned challenge of bandwidth and funding, cities may not employ an energy specialist nor be able to intervene in energy regulation. Even when cities become involved in clean energy projects and policy advocacy, the public is less well versed in these issues and solutions to the point that there is less community partnership and input. Both cities have franchise agreements with Dominion Energy, which are the state's major investor-owned utilities (IOUs). Both states are located within regulated retail electricity markets, so cities cannot decide between utility agreements and must partner with whichever monopoly utility is within their municipality territory.

For Dominion Energy, this monopoly structure is focused on a viable business model for its shareholders. However, the regulated structure means that public utility commissions are the regulators that evaluate costs and decisions that affect rate payers to make the grid affordable, profitable, and reliable (State Government Employee). Regardless, this structure does not incentivize collaboration and customer input. After the stamp of approval for the public service commission, there has not traditionally been consultation or collaboration on the behalf of the ratepayer. This presents an inherent flaw with this monopoly structure that forces service upon

customers without their choice or inclusion on the decision (Non-Profit Employee). Energy policies are also already quite technical and difficult to understand the regulatory structure, so even local efforts to enact or push for reform can be a major challenge for cities' clean energy pledges. The jargon itself of the utility regulatory field may dissuade public attention and involvement (City Employee).

For Richmond, a major challenge relates to its own municipal natural gas utility that fuels the city and other surrounding localities. It is the elephant in the room for Richmond as it pushes for its clean energy goal. The city still supports its natural gas utility, which is a source of revenue and savings for the city (City Employee). In addition, Dominion is not only headquartered in Richmond, Virginia, but also has tremendous power over the commonwealth through its lobbying efforts. As a result, Virginia state government officials note that this clean energy transformation will be complex and costly because so much regulation and funding has been spent protecting fossil fuel investments.

However, Virginia's clean energy focused legislation and executive orders has created a momentous shift that then supports local clean energy goals. For example, localities are now conducting feasibility studies about community choice aggregation (CCA) with the support of the non-profit Virginia Clean Energy. CCA maintains the franchise agreement with the city, but this structure allows for the city to operate its own electricity procurement process and decisions. This allows for more agency about electricity prices and sources. While city contracts with incumbent utilities are difficult to change, cities in Virginia are experimenting with the CCA structure in order to control the procurement process according to their own goals and needs (Non-Profit Employee). Virginia Clean Energy even notes that it could be about 7% cheaper for a CCA managed public utility compared to Dominion's residential tariffs (Non-Profit Employee). Richmond's partnership with VA Clean Energy could open the doors to allowing city ownership of their own energy decisions. Despite this opportunity, there are still looming questions about the feasibility of CCAs since it requires utility structure transformations and more city level involvement and commitment to partially run their own energy sector.

In Columbia, SC, the city also contracts with Dominion Power as the incumbent utility of the Midlands and southern region of the state. Their franchise agreement also seems to limit the pressure they can exert as a customer (City Employee). Energy regulation is another can of worms for this city that puts up barriers for everyday people to care and get involved (Non-Profit Employee). While everyone is impacted with a power bill or fossil fuel pollution from utilities, the technical decisions that go into coal plant closures and solar investments is not a simple issue to understand. However, the public is aware of major crises that then impact their electricity rate.

With the VC Summer nuclear debacle, the public, as well as the regulators and legislators, completely shifted their mentality of the monopoly energy structure. For state legislation, this not only meant Public Service Commission reform but also investigating market reform for increased competition. While state legislation for 100% clean energy goals is not quite palatable and feasible yet in the Republican majority state legislature, state legislation may open the doors for electricity market competition (Non-Profit Employee).

This is an interesting point of comparison with Virginia, which is also under a vertically integrated model, but has partial retail choice with its purchasing power within a regional transmission organization (RTO) in the PJM market. As a result, the state has more access to clean energy options within this regional market. Likewise, South Carolina nonprofit advocates note that market reform could allow for the entry of more solar companies within the state that

then compete with the larger utilities (Non-Profit Employee). Despite the current efforts for research and tentative change, market reform is a highly complex transformation that requires more attention and work than is currently being committed. While Virginia can experiment with new policy innovations such as CCAs, Columbia has no such power or ability because such transformations require actual policy changes first.

Despite the growing familiarity with terms such as energy justice and democracy used by scholars such as Bridge and Welton in the literature review, even city staff and politicians note that they do not have the expertise or capacity to navigate these increasingly complex subjects. For city 100% clean energy goals, gaps emerge between pledges and actions due to the limited experience and knowledge in city staff and council to understand how to actually accomplish what their goals say on paper. These two city's franchise agreements with Dominion and especially Richmond's own natural gas plant is a sensitive subject that will need to be questioned in order to move away from fossil fuels in the near future. However, both cities lack the expertise and full political and market ability to realize these fossil free goals.

Bandwidth and funding

Especially for interviewees employed by or involved with their city government, many noted challenges related to limited bandwidth and restricted funding opportunities. Despite any city's leadership and grand aspirations for a more sustainable future, city administration falls short on their pledges because from a professional and procedural perspective, city staff are not expected to push boundaries or change the status quo. Unlike the local politicians that may have more freedom to declare goals and pass ordinances, city staff are more challenged to shift their internal work environment. Success of city goals stems from city leadership giving their staff the opportunity and ability to accomplish those goals. This means investing in paid positions within a separate city sustainability department.

City staffers noted that the biggest challenge to accomplishing ambitious goals was a lack of time. With limited time and competing work priorities based on more immediate needs, city staff struggles to prioritize proactive climate action. Additionally, sustainability departments must be well funded through their own city budget or through state and federal grants or banking incentives to plan and initiative clean energy projects. However, these funding sources and their amounts depend on an administration's priorities, whether that be at a local, state, or federal level.

For example, while Columbia has ambitious clean energy goals, they only fund and staff one city employee to oversee climate related goals and tasks. From their inception, the Climate Protection Action Committee and the Sustainability Coordinator role were not formed to address broader political changes and complex climate goals. Like most cities in the U.S., once Columbia finished their greenhouse gas assessment of city government operations, their sustainability work and volunteer board mostly focused on recycling and other reactive solutions. According to a few interviewees, it is a part of Columbia's culture to not push boundaries and instead maintain the status quo. Although the mayor's political aspirations led to climate action plans and clean energy goals, there was not a concerted effort to actually realize how to accomplish those goals at a city level. Instead, the city of Columbia relies on volunteers on CPAC to push boundaries, but without giving them the legitimate responsibility or power to do so. While community involvement in the form of volunteer commissions shows a desire for stakeholder input, it also shows a lack of commitment from city leaders that they are not willing to invest in multiple staff positions or create a clean energy budget.

For Richmond, informants noted that it is difficult to prioritize large investments in energy because there are still so many other priorities to focus on. Additionally, that capital must first be available in order to even plan for and begin investing (City Politician). The Sustainability Office's work is already complicated and complex from the way that it constantly overlaps and intertwines with so much local government work. As a result, staff members find themselves pulled in a million different directions while wearing so many different hats in their one position (City Employee). Their office of four works hard to align their work with the rest of the city departments and council, but they face a constant challenge of managing a sustainable bandwidth of work and attention while being pulled in different directions (City Employee).

Additionally, the office of sustainability's position in the city's administrative hierarchy places them lower in power when it comes to enforcement. As a result, sustainability studies and energy recommendations may take longer to work through city bureaucracy and to reach the decision makers at the top. Thus, staff noted the importance of hired consultants to help focus on one project at a time. Likewise, their green city commission, which is a board appointed citizen volunteer group, helps bring more hands and voices to the decision-making table (City Employee). No matter how many sustainability employees or representatives exist, if the city cannot or does not support these efforts with adequate funding, it is a challenge to accomplish their goals. Hiring a consultant adds to the city's overall budget, as does supporting a compensated citizen board. Likewise, even if the city or sustainability office had a large budget, they must also ensure that money is distributed in an equitable manner. While the city is recognizing its historical disinvestments in low income and black neighborhoods, planners are also concerned about supporting the historic parts of the city that are wealthier and whiter (City Employee). Additionally, a lot of their current budget is appropriated to simply maintaining what already exists (City Employee).

With Columbia's 2036 goal looming in the near future, city staff noted this pledge as an ambition and opportunity, but mostly this timeframe is a challenge and perhaps a hindrance to accomplishing an unrealistic goal (City Employee). Columbia deals with the same funding and bandwidth issues as noted before, but to a greater extent. The mindset seems to be, 'what can we do that doesn't cost a ton of money but makes a big impact?' (City Employee). As noted by the city lobbyist, the city cannot do everything that it aspires to accomplish because there are financial limits (City Employee). City staff and CPAC members complained about financial constraints that incentivize the cheapest decision possible (City Volunteer). The financial constraints noted include the city's lower property tax revenue as a state capital from untaxed state, religious, and university buildings, financial capacity (City Volunteer). Additionally, Columbia also deals with Richmond's challenge of aging infrastructure (City Politician). Columbia has only hired one full time staff as the sustainability coordinator and relies on a fully volunteer citizen committee called the Climate Protection Action Committee (City Volunteer). These volunteers have full time jobs and other personal commitments that makes CPAC not as vibrant and effective as it could be (City Politician). As a former CPAC chair noted, the limited or lack of funding invested in its city pledges for clean energy and sustainability in general shows a lack of commitment and political will.

Funding is also determined in election politics. For example, budget proposals, wastewater treatment rates, and local taxes are key issues in mayoral and council candidate platforms. According to a city staff vice president official, local elections and administrative priorities determine this funding process, which then trickle down into the aforementioned budget and bandwidth challenges for all city staff (City Employee). Without the funding to hire a

consultant with energy expertise or greenhouse gas assessment capabilities, the one-person role and volunteer commission remains one of the biggest hindrances to accomplishing city level goals (City Volunteer).

Limited Internal and External City Collaboration and Partnership

Collaborative relationships are essential to any form of work, but especially within a field as interconnected as sustainability. Despite these crucial benefits, the most cited challenge for all interviewees includes breaking down siloes. City interviewees noted how siloes between and within staff department and council prevent communication and coordinated work. Likewise, the separation between local and state government creates more fractures than it allows for consistent collaboration. From interviewee responses, there seems to be a consensus that policymaking both on local and state levels have not been well coordinated. This has led to more gradual or delayed action because of lacking consensus and teamwork to accomplish interconnected goals.

When asked about the challenge of coordination, Virginia government officials noted the necessary shift towards a whole new way of thinking that would assuage tension between state agencies, state government and their constituencies. When communication and collaboration is reactive instead of proactive, one informant noted, Virginia and Richmond government has better opportunities for outreach and partnership (State Government Employee). City staff noted that limitations to collaboration have meant missing opportunities to improve on their work and make it more effective for the community in the long term (City Employee).

While there are always professional and political challenges to collaborate, Virginia interviewees noted more solutions and opportunities than South Carolina. Whether this is the result of professional, political, or jurisdictional mismatch, there are fractures between departments and positions because of these firm siloes (City Employee). This is especially true for the jurisdictional separation between the city of Columbia and Richland County. While these boundary areas are connected, city and county sustainability efforts or clean energy collaboration is limited or vacant in the face of this missing relationship (City Employee). This is also true for the city's relationship with the SC Energy Office that is reported as a good relationship by politicians, but in reality, and according to staff and CPAC members, is very separated and limited.

CPAC members were especially outspoken about challenging siloes even within the city. For example, while the city's planning department was writing the comprehensive master plan, they did not consult or include the sustainability coordinator or CPAC during this process (City Volunteer). CPAC only contributed after the plan's draft was in its final version, so CPAC had limited influence on the city's 10-year vision, which is supposed to include substantial clean energy recommendations according to its initial pledge (City Volunteer). This limited communication also translates into the constraints for staff and council members to share their concerns and ideas. According to CPAC members and the sustainability coordinator, it was evident that the city does not have a culture of asking questions and communicating new ideas and demands (City Volunteer). City staff are only going to do what they are told, without pushing outside the boundaries of their job description and what is imagined as possible (City Volunteer). This also translates into what the city imagines as feasible, since the city represents a minority of Democrats in a Republican majority. For example, my impression is that staff and political leaders are comfortable with their working relationship with Dominion, so they would not dare step into a Republican controlled legislature or intervene in the PSC to make their clean

energy demands (City Volunteer). When city staff, local political leaders, and even city volunteers feel like they are not listened to, action is futile and simply reactive to the consequences of inaction.

As noted in the literature review, limited community engagement and involvement can turn into disengagement and disinterest if the public cannot visualize or feel these changes and how it affects their daily lives. Additionally, any lack or slowness to action can create apathy and mistrust in local officials. If mayors, council members, and city staff fall short on their pledges and resolution goals, the public becomes disengaged and disappointed in the passion for climate action that now is quite limited even on a local government scale. This could build from local to state to federal scales in the public's approval and opinion of how they are fulfilling their goals or not.

It is worth noting that these challenges are not equal in their importance and impact on city efforts to reach 100% renewable goals. While an unlimited budget and staff capacity could alleviate many concerns over the internal abilities to accomplish sustainability goals, the city is still dependent on state and federal directives and utility decisions. Collaboration and coordination must be a political action between local governments and their representatives at higher levels of governance. This is especially true for Columbia, as South Carolina's policy and energy market structure will only allow the city to accomplish a certain threshold of renewable developments and energy decisions. Even for Richmond, the city only really saw tremendous changes once the state made a full commitment for clean energy policy. Additionally, the state's entrance into PJM and ability to create CCAs has impacts on local energy decisions that can use this partial market competition to make their own decisions and accomplish their renewable goals independently of their states or utility's will. Thus, the existing policy stagnation across the nation, alongside the growing partisanship for climate-related policy solutions presents the most burdensome challenge that localities must overcome if they truly intend to turn a symbolic resolution into sustainable changes in the future.

Opportunities and Solutions for City Action

While there are multiple hindrances to city efforts, successful city leadership and collaboration have created important opportunities to address and accomplish clean energy goals to combat climate change. By facilitating diverse partnerships and stakeholder processes within the municipality and across the state, cities can become catalysts for clean energy policy implementation. Throughout each interview, I picked up on key markers of success from each city. These themes spanned from individual leadership and initiative to broader forms of collaboration and relationship building between partners.

The process of creating and sustaining stakeholder processes at community, professional, and political levels was the most consistent theme noted in each interview. I also specifically asked each interviewee about their sense of optimism about their work and their future outlook in their position and field. By the conclusion of each interview, I gathered sufficient notes about each interviewee's perceptions of how their work was or could be successful and the various measures they were taking or could take to improve upon their goals and tasks.

Passionate Leadership on Climate Action

The greatest changes in both cities have arisen from leadership and initiative. Cities have at least one passionate climate champion that is the voice for their city's energy and climate

initiatives. Whether it is the mayor, councilmember, staff member, or residential leader, leadership comes in many forms, but is pivotal to energy pledges and climate declarations being taken seriously. Even in periods of city-specific challenges or policy implementation delays, one leader can be a key catalyst to turn any lack of effort or impeding obstacle into a new focus on action. While cities are striving to lead by example as models for environmental concern, they still need a passionate leader and team of sustainability and energy focused full-time employees to transform rhetoric into action. Leadership also goes beyond personnel. Cities can lead clean energy technology advancements by procuring their own energy resources and accomplishing ambitious energy efficiency savings. Interviewees noted key opportunities in stepping up their own efforts by challenging city residents and respective partners by their own local leadership and example. Sometimes it only takes one leader and political catalyst to lead to innovative and effective climate solutions.

This is clear in Virginia, where clean energy opportunities arise with strong and effective leadership in state agencies, governor's office, and the legislature. This has meant hiring or electing the right people and giving them the power and agency to accomplish climate action. For Virginia's governor's leadership, he put money where his mouth was, which demonstrated his commitment and leadership (State Government Employee). By hiring and appointing a committed staff and agency leadership, Virginia has had success implementing executive orders and legislation regarding clean energy (State Government Employee). Even at a city level, Richmond's recently elected climate-focused council member has made all the difference to initiating and implementing climate action ordinances. For example, this climate advocate in council, who was a former member of the city's volunteer green commission, worked with the city and external organizations to pass the climate emergency ordinance (Non-Profit Employee). When there are obstacles to work from the sustainability or planning department or leadership dwindles from the mayor's office, one new leader can reignite the passion needed to accomplish changes. By electing someone with previous experiences and connections within and outside of the city, Richmond realized the importance of new leadership to reinvigorate and sustain their efforts.

Columbia also deals with challenges to sustain their climate and clean energy leadership, especially in the face of political silence within and outside of the city. Columbia is a bottom-up city where the information and demands comes up through the department heads, through assistant city managers, and then to the mayor (City Employee). While this bureaucratic structure may limit and slow its goals, there are opportunities for even those at the bottom of city government to catalyze the lack of effort into focusing on action (City Staff and City Volunteer). After the pandemic shut down the city, CPAC members, and especially the former chair, realized that the committee can no longer stay quiet (City Volunteer). Initially, they reformed themselves from within to better structure the roles and responsibilities of the committee. Once the committee became a more effective and functional group, they recognized a tremendous surge in leadership from within. That year's chair knew that leading by example and declaring a 100% clean energy pledge is one step, but it takes so much more effort and leadership to accomplish those goals. For CPAC, this meant challenging the city from within. They urged the city's sustainability coordinator, the city's public works assistant manager, and even the council and mayor to agree to a plan that set them on course to meet the 2036 plan. CPAC aimed to hold the rest of the city accountable for its initial pledge and the goals that have yet to be accomplished. As a result of their own leadership within a powerless, volunteer-based committee, CPAC has at least recruited more attention from city staff and leaders with decision making power (City

Volunteer). While leadership ebbs and flows, one spark like this can set off the changes necessary for the city to meet and hopefully exceed their own goals.

Advocacy and Intervention in Energy Regulation and Policy

Intervention and advocacy to the state utility commission has become an evolving best practice by cities aspiring to accomplish energy policy leadership. By engaging in conversations at the regulatory level, cities can empower themselves and make their case before the utility regulators themselves. To democratize the energy sector by including more voices at the decision-making tables, cities can attend regulatory hearings and intervene on the behalf of city residents by advocating for clean energy developments. Cities are already striving to be leaders on local energy policy, so there are opportunities to step outside their governance boundaries by advocating at a state level. As public utility commissions attempt to diversify and broaden their reach to the community residential level, cities can step up and fill this gap by advocating on the behalf of community needs for their clean energy goals. Likewise, cities can become greater advocates to the state legislature by unofficially or officially lobbying for state level policies that encourage their own city clean energy transition.

Virginia is well poised to support local goals for clean energy since the state government has set the bar for clean energy goals with the passage of the Clean Economy Act and Executive Order 43. As one interviewee noted, this provides an example for cities that encourages the formation of their own goals that can even exceed the state's goal. Thus, Virginian cities like Richmond have the state's backing to initiate their own policies (State Government Employee). As of now, Democratic leadership in the federal and state government has assuaged city efforts to push for climate and clean energy-oriented policies (City Employee). For example, the governor and legislature have passed a PACE program for commercial property assessed clean energy that localities can opt into (State Government Employee). Virginia has also indicated the potential of a state-wide or local green banks.

By opening opportunities for funding options and incentives, Virginian policy has addressed some equity concerns in the implementation of their policies (State Government Employee). Therefore, Richmond has the potential to take advantage of what exists in state policy and continue to push for local influence regarding clean energy. As noted by VA Clean Energy, cities could advocate for legislation to create a code of conduct for Dominion Energy stating that Dominion could not spend rate payer funds to influence local government decisions regarding renewable energy. Residents are also becoming savvier and understanding how they can individually participate in or become educated about regulatory proceedings at the state corporation commission (State Government Employee). This has mean more public engagement and comments on local and state level energy issues as well as interaction with political groups that are helping or representing people on how to navigate this complex and technical regulatory landscape. Because Richmond's clean energy goals have state political support and potential to grow, the city has ample opportunities to continue their political aspirations as an advocate for an equitable clean energy transition.

On the other hand, Columbia must push even harder for their clean energy goals without state level support for expansive and swift clean energy goals. Since Columbia is a blue, progressive dot within a majority Republican state, there are few ears for their voices to be listened to. However, the city recognizes that many of their own constituents are progressive environmentalist voters that are increasingly concerned about clean energy (City Employee). While Columbia may not have the political agency and voice to force the state to act, the city has

the opportunity to become a more powerful advocate for city clean energy choice (Non-Profit Employee).

For example, when city residents ask about community solar and building codes to their local leaders, Columbia can take advantage of their official city lobbyist or even their proximity to state policy making to then advocate for city-based policies (Non-Profit Employee). While the SC legislature is still not completely open to climate change discussion, even conservative leaders' welcome efforts to democratize energy and support ratepayers (Non-Profit Employee). As a result of this perspective, the city can advocate for greater inclusion of city leadership in state level PSC decisions that could encourage city clean energy goals (City Volunteer).

Additionally, both states noted tremendous opportunities most recently with federal support and funding through President Biden's administration. Much like the response to President Trump's first few executive orders and directives in office, interviewees from all perspectives noted the major shift in their field and work, such as the funding attached to executive orders and congressional bills such as the Infrastructure and Build Back Better Bill. Even without these concrete changes that allowed them to resume their clean energy priorities, localities and state governments noted their confidence and optimism boost in their own individual and collective work. Likewise, this presented an opportunity to demonstrate their support of federal climate action through maintaining or increasing their commitments as seen in Richmond. However, there is an unrealized opportunity to further support higher level politics even at a local level since state and federal politics control so many funding and policy decisions. Both cities could still demonstrate their political leadership as they did back in 2017 but instead with demonstrations of support towards President Biden and his congressional supporters and advocacy to Congress to pass those same bills that would initiate major climate action across the country. Because climate action can be accomplished through multi-level governance collaboration between and support for each other.

Stakeholder Partnerships and Collaboration

In order to break through siloes and resolve communication challenges, cities can lead stakeholder processes both internally and externally. Interviewees recognized the importance of sustaining partnerships within and outside of their work environment because of how it accomplished connected goals. Such city partners include higher education staff and faculty, non-profit organizations, state agency representatives, and utility employees. My interview methodology facilitated the type of stakeholder process that is possible at a city level when clean energy and sustainability actors are connected. Cities can also achieve more equitable representation within their decision-making processes by including more partners at community and state levels.

Both city cases provided examples of building partnerships and including diverse stakeholders in their goal and task setting processes. Additionally, partnerships at a broader level between cities on a state, regional, and national level still provide local leaders with evidence of how other localities are successful in accomplishing their goals. By sharing research and experiences between each other, various networks for sustainability directors, urban planners, and mayors can help cities advance their goals in more collaborative ways. Richmond's participation in the Virginia Energy and Sustainability Peer Network is an excellent example of this opportunity. This network is comprised of 20 cities, towns, and counties throughout the state. They convene renewable energy procurement workshops in partnership with other organizations such as the World Resource Institute (City Employee). Initiatives and partnerships

like this help local leaders come together to share resources and find mutual solutions to realize their bold visions for the future.

For both South Carolina and Virginia, partnership with their utility is inevitable based on their franchise agreement, but also a key opportunity for collaboration and improved communication of mutual goals. As previously noted, Dominion's headquarters in Richmond means that they have a strong utility relationship, which can present an opportunity for partnership and more direct dialogue about their mutual interests (City Politician). Utility partnership also makes its way into the state policy and administrative process such as with the collaborative stakeholder meetings during the passage of the clean economy act (State Government Employee). While balancing utility inclusion and lobbying, cities could engage more with their utility with their customer purchasing power and ability to advocate for equitable clean energy advancements.

This is also important for officials at a state level because increased utility dialogue benefits their own efforts to catalyze clean energy developments. By welcoming Dominion speakers to state government led webinars or including a representative on committee boards, the utility may not feel as threatened by open discussion about their current and future plans (State Government Employee). While the perception continues that utilities are the bad guy in the room, local and state governments are realizing the potential opportunities by reimagining their role as a voice to consider and listen to at the decision-making table. Utility partnership that includes education about regulatory proceedings and processes with the public service commission or state corporation commission also breaks down barriers about the technical and complex energy decisions taking place. For example, Virginia's energy office partnered with Dominion and the state corporation commission to facilitate stakeholder working group meetings about the shared solar programs (State Government Employee). They examined marketing strategies especially for low-income customers about reduced energy burdens through solar. This has presented an opportunity at a state government level between agencies, utilities, and regulators to have inclusive dialogue that then translates into successful local outreach and implementation (State Government Employee). In this way, partnership led to community outreach that helps build strong community engagement and education for more sustainable solutions moving forward (State Government Employee).

Virginia's state government also put on a clean energy webinar series through the Department of Energy which raised the bar on how to collaborate internally on how to accomplish their goals and programs and how to communicate externally to the public. Even during the passage of the Clean Economy Act, the state facilitated a collaborative and inclusive process to understand all the angles of the bill and the needs of the energy landscape in transition. Collective action and coordination were reported as integral to state level work. With the VA Environmental Quality Agency, for example, an important duty is to incorporate communication and stakeholder engagement into the permitting process. Likewise, the VA Energy Office described one of their jobs as interfacing with local governments to avail them of the opportunities available (funding, partnership) from the federal government and DOE. While there is still room for improvement to push for even more coordination, especially between agencies, agency leaders recognize that collective action is necessary to reduce greenhouse gas emissions. By facilitating conversations between local organizations, VA agencies and political officials can listen to a diverse array of advocates and received valuable input for their programs and policies (State Government Employee).

The same is true for city decisions and policies. Richmond's process for passing the climate emergency ordinance involved diverse groups of organizations and groups through stakeholder meetings, which have helped spur community citizen activism that takes the discussion out of the closed back room (Non-Profit Employee). When Richmond's planning receives suggestions and comments from the public, they have the opportunity to build community trust and confidence in their work. While it can be difficult to encourage historically disinvested and excluded community members, Richmond's planning department tried to draw from diverse backgrounds, ages, and economic sectors by recruiting representatives of official civic groups, but also unofficial leaders of neighborhoods (City Employee). Community leaders of all backgrounds were welcomed into the planning process and returned to meetings because they found them valuable, as well as feeling like their input was being rewarded and captured. Richmond city council members contributed to this effort by using their own neighborhood contacts in their respective districts to do digital and personal outreach. While it is difficult for residents to set aside additional time for another meeting, city planners attempted to still capture their input by attending unrelated community meetings to still take the message right to the people themselves (City Employee). By educating the community at large and especially formally excluded people, there are broader and more effective changes to how a city accomplishes their community-based goals and plans.

Through my interviews, I recognized limited partnership and communication as Columbia's central obstacle to realizing their sustainability work for 100% renewable. However, there are efforts in progress that may reduce these internal and external siloes. The city's planning department seems to best understand the interdisciplinary nature of their work and the sustainability goals. For example, the comprehensive plan moving forward has worked with the sustainability coordinator on updating and adding more language about solar energy and green building incentives in order to advance renewable. City planning in general has shifted to prioritize public opinion and collaboration. Even at a county level, planners recognize that more collaboration is necessary for Columbia to encourage broader effects outside of city boundaries. While the county does not yet have a focus on clean energy, the city's climate action goals are opportunities for collaboration and advocacy at a larger scale (City Employee). As noted by the former CPAC chair, Columbia must understand its influence and role as a city within a county that incorporates multiple municipalities within that same county (City Volunteer).

Because these local ordinances and city climate action plans also have intentions for political leadership and advocacy, cities have opportunities to motivate and mobilize the public at large. In my Columbia city interviews with the mayor and CPAC members, they noted the opportunity for public pressures on politicians as a result of the city's own attempts to advance environmental policies (City Politician). While the public can more easily communicate to politicians and hold elected officials accountable, Columbia's proximity to the legislature at the statehouse motivates them to keep pushing for change that keeps the public motivated for state leadership as well (City Politician). Additionally, the city is beginning to recognize its own power as an influential electricity customer that could exert more influence over its energy decisions. Once city leaders noticed how influential large businesses such as Walmart could be on utility decisions to add more solar, the city has shifted its mindset about its relationship with their utility provider (City Volunteer). While the city manages its franchise agreement with Dominion and maintains a symbiotic and communicative relationship, even a city VP understands that by working together, the city can still respectively challenge and press them to permit solar projects (City Employee). As a large consumer of energy that houses other large

consumers, such as universities, hospitals, government agencies, businesses, and more, the city can also exert pressure on the utility itself (City Volunteer).

Despite these various opportunities for collaboration and partnership, there is still so much more potential to take advantage of. The city must cultivate better relationships with entities that already exist within city boundaries, such as the nearby SC Energy Office or Department of Commerce (City Politician). SC non-profits can be used as examples for improving their connections with other local community groups and community development organizations. From this process, traditional conservation groups have been able to expand their reach and agenda to include energy poverty, such as with the connected through crisis campaign. As a result, these capital cities have unique opportunities for stakeholder collaboration with these entities. Since Columbia still has a lot of tasks to advance in comparison to other cities with the same goals, there are partnership opportunities even between other cities, such as Richmond VA. City staff, politicians, and CPAC can learn from and work with different cities to push their own agenda forward (City Volunteer and City Politician).

Conclusion

Throughout the interview and research process, I recognized emerging recommendations that these specific cities, and cities in general, could relate to. The following outline of recommendations stem from a synthesis of my literature review and interview analysis.

- Recommendations
 - Diversify and expand the decision-making table
 - Collaborate with a diverse group of community partners and stakeholders including state government leaders, NGO employees, residential leaders or members, and utility employees
 - Research groups with vested interests in your work (i.e., housing agencies, interfaith groups, construction businesses, local renewable contractors, universities)
 - Take advantage of the city's role as the capital with its proximity to state politics, university researchers and resources, and key businesses
 - Empower the city's office of sustainability
 - Position sustainability coordinators in the mayor's office or in a more powerful role
 - Integrate their plans and work throughout the entire city
 - Think about long term savings and priorities when distributing the budget
 - Hold city staff and officials accountable and responsible for their commitments and plans
 - Actively engage with state politics and regulation
 - Consistently work alongside state agencies and utilize their expertise and funding opportunities
 - Advocate for pro-environment and clean energy policies with engagement with the district's representative and senator and demonstrating public pressure for such policies
 - Intervene in the Public Service Commission during public comment periods or through formal interventions in regulatory proceedings

- Utilize the city's lobbyist to make sure that the city's goals are at least addressed or made aware at a state level
- Provide access to the city's plan, updates, and other communication content
 - Publish updates and annual reports that are easily accessible to the public
 - Provide opportunities for comments and questions to the city about these plans and updates
 - Maintain an updated and clear website alongside consistent email and social media communication
 - Review the city's sustainability plans and commitments on a regular basis (annually at least) and present updates with city staff, officials, and community members
 - Interact directly with these community members and stakeholders on a consistent basis in order to strengthen this working and communicative relationship
- Utilize local, regional, and national networks to share information, experiences, news, and questions about your mutual work
 - Examples: Southeast Sustainability Coordinator Network, Urban Sustainability Directors Network
 - Continuously learn from others and various cities across the country to keep reimagining what is possible within your position or city

Outside of these general recommendations, I realized several key implications and takeaways throughout my research process. I found that while cities are increasingly burdened by various challenges as noted before, local leaders, whether council members, staff, or residents themselves, have an inspiring level of optimism that their efforts can collectively achieve meaningful change. Regardless of political shifts and professional turnover, both cities have inspiring leaders that will sustain these efforts moving forward. While the resolutions on paper may have been politically symbolic in nature initially, city staff and residents alike took these pledges seriously and have recognized the seriousness and importance of these goals moving forward. Because city residents are living through climate change impacts that affect their standard of living now and in the future, the city now understands its imperative duty to improve its city and the wellbeing of its residents. As participation in energy decisions grow and more sustainability and city planning experts are becoming more well versed in energy topics, I think there are major opportunities in the future for transformative reform in how cities accomplish their energy related policies. While there are frustrating obstacles such as political stagnation at state and federal levels, local clean energy work may demonstrate the urgent necessity and feasibility for pro-renewable policies and funding. If more cities realize the opportunities through the above recommendations, it may be possible for more cities to use their political leadership collectively to then push for larger scale changes in the future.

At the conclusion of writing and publishing this thesis, I have gone one step further in the basic requirements of my honors thesis submission. In order to sustain this research process, I have and will continue my outreach process by sharing my research with the same connections I made throughout this thesis process. With participation in city meetings, organization meetings, and local climate focused conferences, I have already been able to transform this document into meaningful dialogue. So far, I have presented at Columbia's CPAC monthly meeting about my initial findings and recommendations. This resulted in a new push to change partnership and

communication strategies in order to receive more public and stakeholder input. Likewise, I presented these same findings to the city's Sierra Club chapter because of their interest in my research process. I was able to educate both environmental advocates and residents of the city, who then realized what the city was doing and had the potential to accomplish. Lastly, I was an organizing committee member and concluding speaker for the city's first Climate Ready Columbia Conference.

By facilitating partner conversations about city sustainability efforts and also sharing my perspective from my research, I was able to connect and reconnect with city leaders and residents that had mutual goals and interests in this work. Currently, I am in the process of translating this dense, scholarly document into a white paper and presentation for each city and a more general document about my research findings. My hope is that this document then becomes more useful and tangible for city leaders to access in their quest for climate action plan guidance, especially for clean energy goals. While also publishing this paper to scholar commons and other publishing sites, my central goal is for this thesis to encourage shifts in policy, mindset, and outlook for the future of city sustainability and clean energy policy.

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