The Economics of Climate Action Plans

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1 Introduction

Climate change presents challenges for leaders and citizens across the globe. International gatherings, such as UN Climate Change Conferences (known as COPs), exist to set overarching goals for emissions reductions. The 2015 Paris Agreement, which came out of COP21, established the goal of limiting warming to well below 2°C above pre-industrial levels. It has been adopted by many nations, nonstate actors (regions and cities), and nongovernmental frameworks, despite being nonbinding. In addition to many of these well-known, national policy decisions, cities around the world are taking climate action.

Solving the climate crisis takes more than pledges, though. It takes action. Cities are a key player in effective climate change solutions. Action by nonstate actors (cities) can lower greenhouse gas (GHG) emissions by up to 14.3% compared to current national policies in the United States alone[1]. Frameworks such as C40 Cities and ICLEI– Local Governments for Sustainability have been developed and employed in cities throughout the globe to address the most pressing environmental, social, and economic issues associated with climate change. This paper will focus on a selection of cities that use ICLEI: Fort Collins, Colorado, Miami, Florida, and Gainesville, Florida.

The policy tool many cities and other nonstate actors use to address their communities' climate concerns is a climate action plan (CAP). Climate action plans are comprehensive strategies on how to bring a community to a more sustainable future. Although cities vary in the organization and creation of their CAPs, they often feature common considerations such as outlining main climate challenges, emissions, energy use, green economy, and equity considerations, along with many other factors specific to each region. This report will analyze Fort Collins, Colorado and Miami, Florida, focusing particularly on economic considerations.

Lastly, it is important to note that CAPs do not exist within a vacuum. City and county governments can initiate policy, but implementation determines its true effectiveness. Conflicting interests between state and local government, as well as energy providers, may introduce challenges to the implementation of CAPs.

The objective of this report is to analyze the economic costs and benefits of climate action plans as a robust policy response to climate change. It will feature Miami, FL and Fort Collins, CO. Research will support the discussion of market externalities, the growth of the green economy, the quantification of natural services, and mortality from heat-related events as economic benefits of CAPs. The discussion of economic costs will include the target cities' budgets and personnel, as well as industry-specific job losses. Throughout the report, insights will be applied to the city of Gainesville, as it is in the process of developing a climate action plan.

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[1] (Kuramochi et al., 2020)

1.1 An Overview of Climate Action Plans

While cities may follow similar frameworks to create their climate action plan, varying concerns and priorities cause each plan to differ. The following section will discuss the CAPs of Fort Collins, Colorado and Miami, Florida, as well as the CAP that is in development in Gainesville, Florida (as of April 2024).

1.1.1 Fort Collins, Colorado

Fort Collins, Colorado published its climate action plan, Our Climate Future (OCF), in 2017. It follows the ICLEI framework, as the city has been a member since 2009. OCF outlined three primary environmental goals: 1) Reduce greenhouse gas emissions by 80% by 2030, using 2005 as a baseline, 2) Provide 100% renewable electricity by 2030 with grid and local sources, and 3) Achieve zero waste or 100% landfill diversion by 2030.

OCF is organized with 13 Big Moves under the four main themes of Better Together, Live Better, Resource Better, and Breathe Better. Within each Big Move sit multiple Next Moves to facilitate implementation. Each Next Move is rated in four categories: Estimated New Investment, Mitigation, Equity, and Resilience, to ensure that OCF is a comprehensive, equitable, and attainable plan[2].

Fort Collins' main climate concerns are wildfires, floods, temperature extremes, water demand, increased development, and human health impacts. The 2005 emissions baseline was 2.3 million metric tons of CO_2, and as of January 2024, the energy mix was 65% coal, 28% wind, 5.9% hydro, and 0.8% solar[3].

1.1.2 Miami, Florida

Miami, Florida launched their Miami Forever Climate Ready plan in January 2020. It also follows the ICLEI framework, with Miami holding membership since 2007. Miami Forever Climate Ready and Miami Forever Carbon Neutral, a plan devoted to carbon neutrality that followed Climate Ready, are a part of Resilient305, a joint effort between the City of Miami, the City of Miami Beach, and Miami-Dade County. This report will focus mainly on the City of Miami's CAP, Miami Forever.

The primary goals of Miami Forever Climate Ready are to ensure that decisions are data-driven and human-centered, to inform, prepare, and engage residents and businesses, to protect and enhance the waterfront, to invest in smart and resilient infrastructure, and to promote adaptive neighborhoods and buildings. Within Miami Forever Carbon Neutral, the city has goals of net zero GHG emissions by 2050 and a 60% reduction in GHG emissions by 2035 using 2018 as a baseline. The plan also includes five GREEN goals: Getting Around Miami, Renewable Energy, Electric Vehicles, Energy Efficiency, and New Economy. Lastly, Miami includes four GROW goals to support the new green economy: Grow the Green Economy Ecosystem, Recruit

[2] (*Our Climate Future.Pdf*, n.d.)
[3] (*Reports || Climate Action*, n.d.)

and Retain a Green Workforce, Open Occupational Pathways, and Welcome and Support Green Industry[4].

Lastly, Miami also includes equity as a consideration in the Miami Forever plans, with it being one of the eight main principles in Miami Forever Climate Ready. Miami's main climate concerns are sea level rise (SLR), flooding, storms, and extreme heat. The 2018 baseline emissions are 3.4 million metric tons of CO_2 and the energy mix as of July 2023 was 69% natural gas, 20% nuclear, 5.4% solar, 4.6% purchased power, 0.7% coal, and 0.1% oil[5].

1.1.3 Gainesville, Florida

As of April 2024, Gainesville, Florida is in the process of creating the city's climate action plan. Gainesville has been a member of ICLEI since 2020. The CAP is a joint effort between 10 teams and a Chief Climate Officer. The 10 teams involved in the creation of Gainesville's CAP are Transportation and Mobile Sources, Residential, Commercial, and Industrial Energy, Solid Waste Management, Water and Wastewater, Local Government Operations, Extreme Heat Response, Food Systems, Community Engagement, Climate Analytics and Modeling, and Funding and Resource Allocation.

The primary goals of Gainesville's upcoming Climate Action Plan are to facilitate net zero GHG emissions by 2045, zero waste by 2040, and to have 80% of the 118 city buses be electric by 2045. Through this, Gainesville is prioritizing the 3 P's: People, Profit, and Planet. A published draft is expected in Fall 2024[6].

The city's 2019 emissions were 3.1 million metric tons of CO_2. As of April 2023, the energy mix was 65% natural gas, 30% biomass, 4.1% coal, 0.9% solar, and 0.7% landfill gas[7].

2 Economic Considerations

The environmental benefits of Climate Action Plans are inherent to each plan and therefore will not be discussed at length in this report. Rather, this report will focus on the economic considerations of such a policy. Economics are of particular interest in Gainesville, and on a wider scale in the state of Florida. House Bill 1645 of the Florida legislature stipulates that cost-effectiveness, reliability, and support of economic growth be the driving factors of Florida's energy supply[8]. No consideration is given to issues of climate change or environmental sustainability. Therefore, this report will analyze the CAPs of Miami and Fort Collins through an economic lens, to reconcile economic and environmental outcomes and increase public understanding of the issue.

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[4] (*Miami-Forever-Carbon-Neutral-FULL.Pdf*, n.d.)
[5] (*Miami GHG Inventory 2018*, n.d.)
[6] (*Climate Action*, n.d.)
[7] (*Gainesville 2019 GHG Inventory.Pdf*, n.d.)
[8] https://www.flsenate.gov/Session/Bill/2024/1645

2.1 Economic Benefits

2.1.1 Addressing Market Failures

Mechanisms that tie the environment to the economy, such as carbon credits, carbon taxes, and the social cost of carbon, attempt to capture carbon emission externalities. An externality is an indirect cost or benefit that is not included in a market transaction. Additionally, clean air is a common good; Everyone has access to it and is incentivized to act in their interest, leading to the ultimate depletion of the resource. In the case of climate change, carbon emissions that pollute the air are negative externalities because producers are not subject to the cost of pollution, and therefore do not have an incentive to reduce their emissions. By assigning a cost to negative externalities, economists attempt to internalize the damage and fix the market failure. Many CAPs recognize decarbonization as one of their main goals for this reason.

2.1.2 Growth in the Green Economy

Studies show that clean energy is good for the economy. Garrett-Peltier finds that the fossil fuel industry creates 2.65 full-time-equivalent (FTE) jobs per $1 million spent. However, if that same $1 million is spent on renewable energy, it can create 7.49 FTE jobs, or 7.72 FTE jobs if spent on energy efficiency. Thus, every million dollars shifted from fossil fuels to green energy will create a net increase of 5 jobs[9].

Furthermore, the US green economy is growing. Data from the Low Carbon and Environmental Goods and Services Sector (LCEGSS) reveal that the US green economy employs nearly 9.5 million workers and represents $1.3 trillion in annual sales revenue, an increase of over 20% between 2013 and 2016[10].

Additionally, of the occupations expected by the Bureau of Labor Statistics to have the most growth over 2020-2023, two are green jobs: wind turbine service technicians (68% increase, 4,700 jobs) and solar photovoltaic installers (52% increase, 6,100 jobs). Environmental scientists and specialist positions, including health specialist roles, are expected to increase by 7,300 jobs in that same period. This is significant because it reveals that growth in the green economy is not a benefit awarded only to high-education jobs. High school diploma and postsecondary nondegree awards are required for solar installation and wind turbine service. Opportunities exist, therefore, for the rise of the green economy to facilitate equitable economic growth[11].

This fact does not escape the view of CAP planners. In Fort Collins, two of the 13 Big Moves relate to the economy: Big Move 9: Healthy Local Economy and Jobs, and Big Move 10: Zero Waste Economy. The Next Steps within Big Move 9 are to update the 2015 Economic Health Strategic Plan to current economic conditions (which was completed in 2023), to support small businesses and workforce development in times of crisis and stability, to reimagine a sustainable business program, and to explore opportunities for multilingual businesses and

[9] (Garrett-Peltier, 2017)
[10] (Georgeson & Maslin, 2019)
[11] (*Green Growth*, n.d.)

workforce development programs. Big Move 10's Next Steps are to support the creation of a digital marketplace for industrial waste and to continue the exploration of soil reuse from City projects[12]. Fort Collins is clear in their mission to pave a future of environmental integrity while putting people first, as these next steps are rated against the four factors of Estimated New Investment, Mitigation, Equity, and Resilience.

Since most of the economic objectives reside in Fort Collins' Economic Health Strategic Plan, the focus of the CAP isn't directly on economics. This contrasts with Miami Forever Climate Ready, which features a targeted analysis of the city's green economy and an action plan for expansion, known as Miami Forever Carbon Neutral: Growing the New Green Economy. This report found that green jobs in Miami are more resilient, higher paying, and more accessible. The green sectors saw a 3.8% annualized growth rate compared to 1% in non-green sectors, from 2015-2019. Green sectors were defined to include Energy, Buildings, Waste Management, Sensors, Transportation, Instruments and related Research and Development (R&D), Regulation & Advocacy, Education, and Climate Resilient Infrastructure. In 2019, these industries held 5,150 jobs and approximately $1.1 billion in output, and importantly, Miami reports that green industries had fewer job losses (1% decline between 2019 and 2020) due to the COVID-19 pandemic than non-green sectors (5% decline), indicating higher resilience. It is important to note here that one of Miami's largest traditional non-green sectors is Tourism, however, green jobs were also more resilient than those in Professional Services.

Furthermore, in Miami, a higher percentage of green jobs (65%) pay livable wages than do jobs in traditional sectors (53%). Officials predict that the median wage will climb as demand for green jobs increases, emphasizing a need to ensure equitable access to these positions through the implementation of the CAP. Moreover, 60% of green jobs are considered middle-skill, requiring a level of education above high school yet below a college degree, whereas middle-skill requirements are only seen in 38% of traditional jobs. Miami has identified opportunities for the growth of green sectors through the implementation of its GREEN goals of transportation, energy, EVs, and building efficiency.

Research and data from cities, the Bureau of Labor Statistics, independent studies, and international datasets show high growth in the green economy and higher returns in terms of FTE jobs on green investment. Therefore, it is advantageous for cities to consider the future direction of industry and recognize the tie between environmental conditions and economic outcomes that will continue to strengthen in the face of climate challenges. As for Gainesville, it can be beneficial to include green economy considerations in the development of the CAP. Investment in green energy and other environmentally conscious economic activities can create equitable jobs that enhance the community environmentally, socially, and economically.

2.1.3 Natural Services

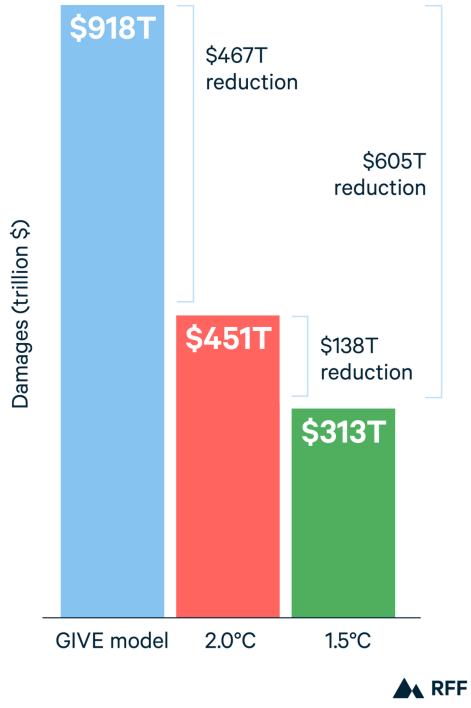
One of the largest challenges of accounting for climate change in the economy is putting a dollar amount on natural services. Estimates on future population, GDP, emissions trajectories,

[12] (*LWV Ft Collins 2 Year Tactical Plan.Pdf*, n.d.)

and the social cost of carbon (SCC) are used to predict savings in today's dollars, also known as net present value (NPV), for varying levels of climate action.

Another term often included in these discussions is a discount rate. A discount rate is an interest rate that can be used to compare future and present values. Discount rates and concern for the future are inversely related. That is, a high discount rate reflects little emphasis placed on sustaining the environment for future generations and a low willingness to pay today for future benefits. Conversely, a low discount rate reflects a high level of consideration of the future and a higher willingness to pay today in order to receive benefits in the future. Discount rates are particularly interesting in discussing climate change because they are an input to climate and economic models.

These models are called integrated assessment models (IAMs). They attempt to estimate the global economic benefits of limiting temperature rise to certain thresholds above preindustrial levels. Using an IAM called the Greenhouse Gas Value Estimator (GIVE) model, Resources for the Future estimates that reducing temperature rise from a baseline of 2.5°C to 2.0°C above pre-industrial levels would yield a cumulative economic benefit of $467 trillion NPV through 2300, or $5.2 trillion per year. This is 1.5% of the cumulative expected present value of global GDP over that time. An additional one-degree cooler (dropping warming to 1.5ºC above preindustrial values) would generate $138 trillion, bringing the total benefits to $605 trillion and 2% of GDP, or $6.8 trillion annually. These figures reflect savings from avoided damages compared to the $918 trillion discounted climate damages that are expected to accumulate between 2020 and 2300 with 2.5°C warming[13].



Cumulative Expected Present Value of Total Climate Damages from the Baseline GIVE Model Through 2300, Along with Models That Follow the 1.5°C and "Well Below" 2°C Pathways

[13] (*The Economic Benefits of Achieving the Paris Agreement Goals*, n.d.)

The above values show the impact of climate change on the economy through 2300, and importantly, are lower bounds. The GIVE model is an updated IAM that takes into consideration projections of per capita economic growth, population, carbon dioxide, methane, and nitrous oxide emissions. A significant improvement in IAMs has been the ability to account for costs not in GDP, such as mortality risk, as well as policy and economic growth uncertainties. This enables the GIVE model to evaluate risk from compounding uncertainties and output a more accurate estimate of the costs that CAPs avoid. However, these estimates remain conservative because they do not include other climate harms such as biodiversity loss, decreased labor productivity, and fires.

The rewards from climate action are not only in the distant future, though. To conceptualize the benefits of addressing climate change on a closer time horizon than 2300, the World Economic Forum reported a potential to gain $43 trillion in NPV to the global economy by 2070. Unchecked climate change will bring an estimated $178 trillion in global economic losses between 2022 and 2070. However, by addressing the climate crisis and limiting warming to 1.5ºC above preindustrial levels, the US alone is predicted to gain $885 billion of the global $43 trillion by 2070. This dividend is larger than the current combined annual revenues of Microsoft, Amazon, and Alphabet[14].

Another important calculation used to estimate the economic benefit of CAPs is the social cost of carbon (SCC). The social cost of carbon is a measure of the value of damages to society from each additional metric ton of carbon dioxide emissions[15]. The US government's figures for the SCC are $51 per ton, however, recent data suggest that this number is exceedingly low. Rennert et al. prefer the mean SCC of $185 per ton, out of a range of $44 to $413 per tCO_2 in 2020 US dollars, with a 2% discount rate. This number is an aggregate of the SCC for agriculture ($84 per tCO_2), energy ($9 per tCO_2), temperature mortality ($90 per tCO_2), and sea-level rise ($2 per tCO_2).

Although difficult, it is useful to attempt to quantify the benefits brought by the environment. The first step in this is to have a comprehensive understanding of a city's use of natural services, as well as the threats that those services face. In Gainesville, a climate change vulnerability assessment is being created to do just that. Once created, the city can utilize SCC, NPV, and outputs from IAMs such as the GIVE Model to gain insight into the most appropriate policy solutions.

2.1.4 Impacts on Human Health

Lastly, many CAPs address the impact of climate change on human health. Two large health implications are air pollution and extreme heat. As extreme weather events increase in frequency and intensity due to anthropogenic (human-caused) climate change, the costs of related mortality will increase as well.

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[14] (*One More Reason for Rapid Climate Action*, 2022)
[15] (Rennert et al., 2022)

Air Pollution

In the United States, air pollution from fossil fuels causes 194,000 avoidable deaths per year, by far the majority of the 230,000 annual avoidable deaths from all anthropogenic sources of pollution[16]. Air pollution also leads to increased hospitalization for asthma, total respiratory issues, and heart issues, according to a 2016 study by Schlenker and Walker. Noting that the correlation between air pollution and health may have many confounding variables, such as poverty, health conscientiousness, age, weather, and other factors, Schlenker and Walker studied the impacts on health near the 12 largest airports in California based on increased taxi times due to delays on the East coast. They found that a one standard deviation increase in air pollution leads to an increase in hospital admission for asthma by 17%, total respiratory issues by 17%, and heart issues by 9%. Furthermore, increased air pollution causes one-third of the average daily asthma admissions[17].

There is hope, however. Since 2005, deaths attributable to air pollution from fossil fuels have decreased by 15.7%, due to the decrease in coal and liquid natural gas burned for energy[18]. This paints a clear picture of the importance of climate action and a just energy transition. This is particularly notable for Gainesville, as 65% of the energy mix in 2019 came from burning natural gas. Health considerations, for both the environment and humans, exist in energy decisions.

Extreme Heat

Extreme heat events are another threat associated with the climate crisis. Mortality is increasing due to anthropogenic climate change on every continent. In the United States, 34.7% of warm-season heat-related deaths are caused by climate change. Gainesville has an average of 3 annual deaths due to heat, with 45.4% of this mortality caused by anthropogenic climate change. In Miami, 43.7% of their 28 average annual heat-related deaths are attributed to human-induced climate change. The most striking aspect of these figures is that they are based on a one-degree Celsius global warming, which lies below the strictest recommendation of the Paris Agreement (1.5 – 2ºC)[19]. If the average global temperature reaches 2ºC above pre-industrial times by 2050, the United States will see 37,244 heat-related deaths and the world will see a 370% increase in heat-related deaths. Under the 3.7-degree scenario, the US number of deaths climbs to 44,992[20]. At the current rate, the world is on track to reach 2.7ºC warming by 2100.

The impacts of increased avoidable deaths span social and economic sectors. Not only are avoidable deaths bad for the obvious reason of the loss of life, but they also cause emotional harm to the family, the financial burden of funeral costs, and wider economic impacts through labor loss. In 2022 alone, 490 billion potential hours of labor were lost due to heat exposure globally, and if 2ºC is reached by 2050, labor loss due to heat is expected to increase by 50%[21].

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[16] (Lelieveld et al., 2019)
[17] (Schlenker & Walker, 2016)
[18] (*Interactive: The Data behind the 2023 Report of the Lancet Countdown on Health and Climate Change*, n.d.)
[19] (Vicedo-Cabrera et al., 2021)
[20] (Romanello et al., 2023)
[21] (*Interactive: The Data behind the 2023 Report of the Lancet Countdown on Health and Climate Change*, n.d.)

Climate action is, therefore, a viable and *vital* course of action for cities in the US and around the world.

Accordingly, Extreme Heat Response is one of the 10 teams associated with the construction of Gainesville's CAP. Not only is extreme heat dangerous for human health, but it also decreases productivity and creates additional unnecessary losses due to climate change. By taking this step, Gainesville can avoid unnecessary deaths in the community and curb labor productivity declines that come with extreme heat.

2.2 Economic Costs

Any public policy decision is not without costs. CAP costs include the direct costs of implementation, personnel, and time devoted to creation and execution. Additionally, shifts in industry can be considered when analyzing the entire cost of the policy.

2.2.1 Budget and Personnel

Climate action plans require allocation from city budgets and the devotion of officials' time. The differing ambitions of climate goals, support, and resources will result in varying costs and outcomes of CAPs. An important thing to note is that CAPs are policies written to address many initiatives across multiple sectors and years. Thus, a total budget is not always given until future sub-plans are created to implement a certain goal of the CAP.

In Fort Collins, Colorado, the original estimated cost of OCF, with many ambiguous assumptions, was $1 billion. As of 2023, city staff suggested an additional $7 million per year in the budget to achieve the OCF objectives, on top of the annual investments of $31 million being put towards Big Moves 4, 6, 7, 13, 2, and 10[22].

Furthermore, great effort went into the creation of OCF. Involved groups include the City Council, the City Leadership and Climate Action Executive Team, the Active Members of the Climate Action Plan Community Advisory Committee, The Fort Collins Community City Boards and Commissions Residents and Businesses (1000+ community members), the Fort Collins Triple Bottom Line Community Leaders, the Our Climate Future Plan Ambassadors, the Our Climate Future Staff Teams, the Our Climate Future Consultants, and the Our Climate Future Artwork teams[23]. Each team requires paid staff and devoted hours.

In Miami, there is not a published figure estimating the total cost of all CAP goals. However, in 2017, the $400 million Miami Forever bond was voted on and passed. Of this, $192 million was devoted to sea level rise mitigation and flood prevention, two of Miami's largest threats[24]. As other initiatives are pursued, budgetary numbers are expected to follow.

The personnel devoted to Miami Forever Climate Ready and Miami Forever Carbon Neutral are the Chief Resilience Officer and their team, all Neighborhood Enhancement Team (NET) offices, and departments and staff in the Miami Forever Climate Ready working group, such as Resilience and Public Works, Planning, Communications, Emergency Management, the

[22] (Arndt et al., n.d.) page 55
[23] (*Our Climate Future.Pdf*, n.d.)
[24] (*Miami Forever Bond*, n.d.)

Office of Capital Improvements, and the Office of Resilience and Sustainability. Additionally, all departments in the Resilience Action Group and the deputy city manager contribute to this effort.

In Gainesville, 10 teams are working to develop the city's CAP: Transportation & Mobile Sources Team, Residential, Commercial & Industrial Energy Team, Solid Waste Management Team, Water & Wastewater Team, Local Government Operations Team, Extreme Heat Response Team, Food Systems Team, Community Engagement Team, Climate Analytics & Modeling Team, and Funding & Resource Allocation Team. The main effort on the part of the city, however, is being championed by Dr. Dan Zhu, the Chief Climate Officer. Alachua County is also working on a climate action plan and is working closely with the City of Gainesville. Budgetary figures are expected after the initial draft is published and adjusted according to community feedback.

2.2.2 Shifting Industry

Economic costs can also stem from industry shifting. The International Labor Organization (ILO) reports that although most of the estimated 78 million workers displaced by the shift to the green economy will be able to find their same occupation in another industry, nearly 24 million workers may be left with no equivalent vacancy. Furthermore, an analysis of oil and gas companies by Ernst & Young reveals an estimated 43% of workers will need to be reskilled, a process that may take up to 10 months, and that up to 17% of workers are not expected to be able to be reskilled or upskilled[25].

However, the ILO also estimates 24 million new jobs in energy efficiency, sustainable transportation, and renewable energy by 2030 if the 2015 Paris Agreement is implemented, along with an additional 78 million jobs due to the adoption of a circular economy. Thus, by 2030 there remains a positive balance of 26 million jobs. This is consistent with World Economic Forum estimates of a net increase of 10.3 million jobs by 2030 in the energy sector alone due to the shift to clean energy[26].

Lastly, it is important to note that these are global figures. Two percent of the global labor force is expected to be negatively affected by the green transition[27]. Therefore, it is imperative that CAPs include procedures to ensure a just transition for the industries and sectors specific to each city's respective economy.

2.3 Discussion

2.3.1 Global Cost of Inaction

Comprehensive analyses include both quantitative and qualitative economic factors. Ideally, when evaluating policy, factors such as distributional outcomes are also considered. When discussing climate change, it is commonly known that climate change disproportionately impacts groups of lower socioeconomic backgrounds, both internationally and within the same

[25] (Gueye, 2022)
[26] (*How Many Jobs Could the Clean Energy Transition Create?*, 2022)
[27] (Gueye, 2022)

community. Evaluating the true monetary impact of climate change is challenging, as it includes biodiversity loss, land use change, cost of increased heat, cost of increased mortality from climate change-related deaths, cost of displacement, cost of infrastructure loss due to extreme weather (fires, sea level rise, etc), and much more.

Multiple frameworks exist and have been used to evaluate the cost of climate change and varying levels of climate action, a notable one being the Shared Socio-economic Pathways (SSP)[28]. Within SSP1, the most sustainable pathway, the cumulative estimated economic impact of climate change between 2010 and 2099 is approximately $20 trillion. At SSP2, a middle-of-the-road projection, costs lie between $20 trillion and $60 trillion. At SSP3, a future characterized by high challenges to mitigation and adaptation, the estimated economic impact of climate change is between $40 and $80 trillion[29]. These costs are calculated on account of eight risk factors: coastal inundation, flood, agricultural productivity, cooling and heating demand, hydropower generation, occupational health cost, undernourishment, and thermal power generation.

The figures above reflect the global costs that will be faced by the end of the current century. However, this is not particularly useful to local governments, which must maintain their budget and attend to a variety of constituent needs. Furthermore, the notion of the Tragedy of the Commons may push governments towards inaction, with the thought that they cannot be agents of change, so they might as well continue to use cheap, dirty practices.

It is useful, therefore, to look at cities that have already taken the leap into climate action. What costs did they face, and what benefits have they reaped from this decision? This report discussed these questions for Fort Collins, Colorado and Miami, Florida.

2.3.2 What Gainesville Can Learn from Other Cities

The reality of climate action is that it is a present cost that has future benefits. It is, therefore, imperative to look at the most recent models and estimations for the impact of climate change and to recognize that these models are often underestimates of the true effects. Assessing the needs of each respective city and tailoring a CAP to those needs is a strong first step, and one that Gainesville is currently taking.

Due to the interconnected nature of climate change with the environment, the economy, and health, it is often difficult to quantify the exact benefit gained from certain initiatives. However, a figure from Miami sheds light on the power of the Miami Forever bond in avoiding excess costs from SLR. The $192 million of the bond that was allocated to SLR and flood prevention is projected to avoid $3.2 billion in structural losses from tidal inundation by 2040, as well as protect $385 million in tax revenue from daily tidal inundation by 2070[30]. A first step for Gainesville can be to break down larger climate goals into smaller projects and to calculate savings within those sub-goals. Trying to estimate an all-encompassing budgetary figure, such as what was done in Fort Collins at the number of $1 billion, includes many ambiguities and may

[28] (“Understanding Shared Socio-Economic Pathways (SSPs),” n.d.)
[29] (Oda et al., 2023)
[30] (*Sea Level Rise and Flooding*, n.d.)

pose challenges when trying to pass climate policies, especially with those who may not favor the subject matter. Taking an approach similar to Miami, however, may prove successful for Gainesville as the city begins future steps of budgeting and approvals.

3 Conclusion

Overall, it is clear that climate action is an economically viable decision, both on a global and a local scale. Shifting to the green economy will boost jobs while fostering a cooler future. By staying below 1.5ºC, the global economy has the opportunity to gain a lower bound of $43 trillion by 2070 and $467 trillion by 2300, in net present value. Additionally, every million dollars invested in renewable energy instead of fossil fuels produces a net increase of 5 jobs, making renewable energy investments a clear economic choice. Lastly, not only are these jobs being created, but they tend to be more accessible than traditional-sector jobs, allowing CAPs the opportunity to contribute to a just green economy.

Fort Collins and Miami offer a glimpse into the environmentally and economically sound choices cities are making. For example, by 2040, without action on sea level rise, Miami risks $3.2 billion in structural losses, a number that greatly outweighs the $192 million Miami Forever bond devoted to SLR and flood prevention.

The key to cities justifying the economics of their climate action plans lies in quantifying the environmental risk of each component of the plan. The climate crisis impacts all communities, whether it is through extreme heat, displacement, rising energy costs, health impacts, drought, fires, or sea-level rise. In identifying and assigning values to their prime risks, cities can see a more comprehensive picture of why climate action matters. Conducting this for each small and digestible goal can clear ambiguity and show CAPs to be the socially, environmentally, and economically robust solution that they are.

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