MIAMI-DADE CLIMATE ACTION STRATEGY

MIAMI-DADE COUNTY

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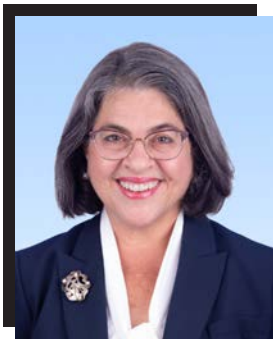
LETTER FROM MAYOR DANIELLA LEVINE CAVA

Climate change is increasingly visible, undeniable and inevitable, across the globe and here at home. I came into office as your County mayor to make sure we prepare for the future with determination and hope. I will not run or hide from the challenges, and I will make sure you are informed and ready to engage with me in the solutions. I have urged all Miami-Dade County Departments to swiftly implement the recommendations in this Climate Action Strategy (CAS). Officially launched on Oct. 27, 2021, this plan describes work taking place on multiple fronts to cut Miami-Dade's greenhouse gas emissions 50 percent by 2030 from 2019 levels, with the goal of achieving net zero by 2050. This Strategy reflects an unprecedented level of teamwork both within County government and throughout our entire community. Building on the coordination and strength of long-standing partnerships, the CAS also provides a template for other cities and counties through our great partnership with the ICLEI Local Governments for Sustainability working group. These elected leaders from around the world stood with me to unveil our plan at the United Nations 26th Conference of Parties (COP26) in November 2021. In order to achieve our ambitious goals, we must continue to support our multiple regional partners, as we together transition to clean, renewable energy sources, improve energy efficiency, and create new economic opportunity.

A prime example of the collaborative strength of CAS is the Clean Energy 2030 Task Force report, created by the Miami-Dade County Public School Board and released on February 9, 2022. This report outlines how our public schools will seek to achieve 100 percent net-zero clean energy by 2030, which helps advance the County's CAS objectives while fulfilling Miami-Dade's pledge to be a leading partner in ICLEI's international Race to Zero. Municipalities joining us in this Countywide strategy include Miami and Miami Beach, which both released their strategies in 2022.

With each new scientific report released on the effects of climate change, the call to urgent action becomes clearer: We must urgently accelerate the transition away from greenhouse gases. The increasing costs of inaction are simply too great. In 2020, extreme weather cost U.S. taxpayers $99 billion; 2021 was even worse. And this does not take into account other socio-economic effects of climate change, which range from ecosystem degradation disrupting global food and water supplies to increases in tropical diseases, the overwhelming costs of displacement following floods and wildfires, and the tragic loss of lives and livelihoods due to increasing extreme heat events, which are the world's "number one silent killer," claiming more lives each year than all other natural disasters combined.



These challenges can be overwhelming. Fortunately, Miami-Dade's strength is in our ability to harness opportunity. Our climate opportunity lies in embracing a green economy and propelling us into a renaissance of human ingenuity. Our "SMART" transit plan and land use policies designed to shift away from endless urban sprawl are critically important carbon-cutting economic development strategies. Our nationally renowned "Environmentally Endangered Lands" program to protect and restore critical wetland and forests provide valuable "carbon sinks" that bring enormous economic benefit to our community while protecting us from the impacts of climate change. Our county parks are being transformed into areas that can help absorb water to help mitigate flood risks. And our growing blue-green tech economy drives innovation for sustainability while also creating jobs for the future, fueled by our County's own economic development team.

I am grateful to the many organizations, local government employees and residents who collaborated to help create Miami-Dade County's Climate Action Strategy. We are now at the pivotal stage of implementing recommendations in this plan. This "all in" strategy ensures that no community is left behind as we develop a new blue-green economy that not only reduces emissions but also helps guarantee that our community has clean air to breathe, fresh water to drink, and a thriving ecosystem in which to live, work and play more resiliently. CAS will help us build back better - sustainably and resiliently - as we work to make Miami-Dade "future ready."

To make sure that the ideas in this Strategy leap off the drawing board to become real-world solutions, I've established a Resilience Action Team with leaders from all departments in Miami-Dade government, led by our new Resilience Planning Director, and also appointed the world's first Chief Heat Officer and the County's first Chief Bay Officer. I've met with amazing youth and environmental justice advocates and look forward to continuing to collaborate on equitable, community-driven climate solutions.

I thank everyone who reads this Climate Action Strategy and takes action to help heal our planet. Whether you are already engaged in this critical work, or new to the conversation, we depend on your continuing interest and dedication to meet the challenges ahead.

Miami-Dade County

Mayor DANIELLA LEVINE CAVA

Daniella Levine Cava

INTRODUCTION

Climate change threatens lives and livelihoods in our community and all around the world. The increasing impacts of this crisis have led to global consensus urging everyone everywhere to take immediate action to avoid irreversible catastrophic global and local damage that each day is intensified by human activity.

The growing need to drastically reduce Greenhouse Gas (GHG) emissions offers a unique opportunity to rethink and redesign the spaces where we live, work, study, and play. Solutions already available today can be rapidly implemented and scaled up in a just, equitable way to improve quality of life, public health, local economies, and job options for all, particularly the most vulnerable in our community. The innovative approaches we will use to overcome the existential challenge before us will result in buildings that are more energy-and water-efficient, mobility choices that better meet our needs while ensuring cleaner air, career paths that pay well, and protected and healthy natural areas that are essential to supporting human life and our economies.

Miami-Dade County government's climate leadership dates back to 1988, with the completion of its first GHG inventory. This Climate Action Strategy (CAS) continues this legacy of leadership. The pages that follow detail the most recent work of the County and other private and public sector entities to cut GHG emissions. These efforts align with recommendations from the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report, issued on Aug. 9, 2021.

On April 22, 2021, in commemoration of the 51st anniversary of Earth Day, Mayor Daniella Levine Cava announced Miami-Dade County's commitment to the international Race to Zero, along with over 4,500 other governments, businesses, investors, and academic institutions. This pledge is mobilizing communities to swiftly enact measures to reduce GHG emissions 50% by 2030 compared to 2019 levels and then progress forward to achieve net zero by 2050. By pursuing these goals, Miami-Dade County will fulfill our community's critical role in keeping the increase in global warming below the 1.5°C threshold that scientists note must be achieved to preserve life as we know it on our planet. Pursuit of these goals will also help ensure preservation of our own local quality of life. The Climate Action Strategy paves the way for meeting these goals, through approaches focused on Energy & Buildings, Land Use & Transportation, and Water & Waste.

Achieving the goals set forth in the Climate Action Strategy will require building on our extensive framework of collaboration to include everyone in our community, while also working diligently to secure and accelerate ambitious public and private investments. Numerous organizations in the Resilient305 network have already stepped up to meet the

demands of this existential challenge, ranging from academic institutions and large businesses to community-based organizations and hospitals. Cross-sectoral partnerships also will fulfill essential roles in this endeavor, as will our public utilities. Increasing financial and policy support from the State of Florida and the federal government would assist us in this work.

Seeking to mitigate – or lessen – the damage caused by GHG emissions, the Climate Action Strategy focuses on tackling the problem at its sources. The CAS works in synergy with other plans released in recent years by Miami-Dade County that are designed to cope with adapting to the negative climate-related impacts already affecting our community. For example, the County's Sea Level Rise Strategy addresses climate change impacts such as flooding, from both storm surge and higher groundwater levels. Serving as an overarching umbrella uniting all of these plans is our community's Resilient305 Strategy, which incorporates environmental as well as socio-economic dimensions of resilience, including public health, financial literacy, education, social equity and affordable housing. All these plans, in unison, will help us achieve our goals.

Mayor Daniella Levine Cava at Code Red Day at City of Miami City Hall on September 24, 2021 organized by GenCLEO. GenCLEO students in Miami, Tallahassee, Orlando and Tampa organized Code Red events in Florida in solidarity with Greta Thunberg's international Fridays for Future protest on the same day.

SEVEN APPROACHES TO CUT EMISSIONS 50% BY 2030

According to Miami-Dade County's 2019 Community-Scale Greenhouse Gas (GHG) Emissions Inventory, the majority of GHG emissions in the County come from fossil fuels used in the transportation (55%) and building (41%) sectors, with a small contribution from water and waste (4%).

The seven approaches proposed in this strategy are bold targets that will drive down these major sources of emissions, while meeting these four criteria of incorporating:

- Existing, proven, and economically viable solutions commercially available today.
- High-impact and leading-edge solutions that either make immediate, significant impact or enable large, long-term reductions.
- Action within direct control of the County government.
- Insighted gained from extensive resident and stakeholder feedback gathered during community engagement sessions.

The Climate Action Strategy has been developed in collaboration with Miami-Dade County departments that will play a key role in its implementation.

Combined, the approaches will reduce GHG emissions from 36.4 million metric tons in 2019 to 24.5 million metric tons in 2030, a reduction of 11.9 MMT or 33%. While a gap remains to reach the goal of a 50% cut by 2030, progress will be reported on an annual basis and the Strategy will be updated every five-years to reflect technological advances and new state and federal energy and transportation policies.

The Strategy's seven approaches fall into three categories, based on countywide GHG emissions: Energy & Buildings, Land Use & Transportation, and Water & Waste. Specific targets listed under each approach will direct implementation.

Figure 1 shows GHG emission reductions of the seven approaches, as well as an emissions gap. About 47% of emission reduction comes from energy and buildings targets, 20% comes from transportation targets, and 3% comes from water and waste targets, with a remaining 30% gap in emissions reductions necessary to reach Miami-Dade County's 2030 goal.

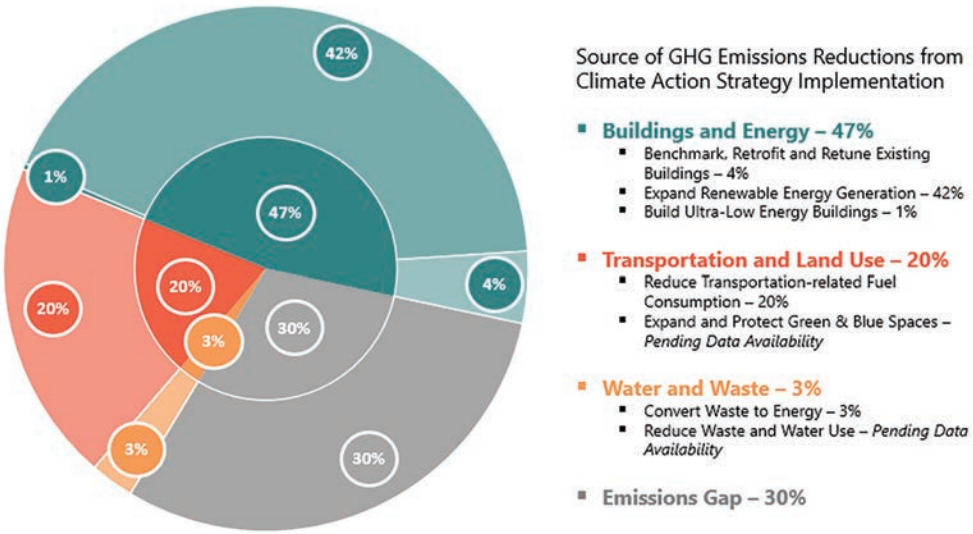


Figure 1

THE 7 APPROACHES AND 2030 TARGETS

ENERGY & BUILDINGS

1. BENCHMARK, RETUNE AND RETROFIT EXISTING BUILDINGS

- BENCHMARK 1.3 BILLION SQUARE FEET COMMUNITYWIDE BY 2026
- RETUNE 1.1 BILLION SQUARE FOOTAGE OF COMMUNITY WIDE BUILDINGS BY 2030
- RETROFIT 167,500 HOMES TO REDUCE ENERGY COSTS 28% PRIORITIZING LOW TO MODERATE INCOME (LMI) HOMES BY 2030

2. EXPAND RENEWABLE ENERGY GENERATION

- INSTALL 61,725 KW OF SOLAR ENERGY BY 2030 ON COUNTY BUILDINGS, LAND, AND WATER EQUIVALENT TO 7,498 HOMES' ELECTRICITY USE FOR ONE YEAR
- INSTALL 794,000 KW OF SOLAR ENERGY BY 2030 ON COMMERCIAL AND RESIDENTIAL BUILDINGS EQUIVALENT TO 104,014 HOMES' ELECTRICITY USE FOR ONE YEAR
- MAXIMIZE PARTICIPATION IN UTILITY-SCALE RENEWABLE ENERGY PROGRAMS

3. BUILD ULTRA-LOW ENERGY BUILDINGS

- REDUCE THE ENERGY USE INTENSITY OF NEW BUILDINGS 20% BY 2030 BELOW 2020 LEVELS

LAND USE & TRANSPORTATION

4. REDUCE TRANSPORTATION-RELATED FUEL CONSUMPTION

- SHIFT 10% OF TRANSPORTATION MODE AWAY FROM SINGLE OCCUPANT VEHICLES BY 2030
- ELECTRIFY THE COUNTY FLEET: 80% OF LIGHT VEHICLES AND 50% OF PUBLIC TRANSIT BUSES BY 2030
- TRANSITION 30% OF COMMUNITYWIDE VEHICLES TO ELECTRIC POWER BY 2030
- REDUCE GREENHOUSE GAS EMISSIONS FROM MIAMI INTERNATIONAL AIRPORT AND PORTMIAMI OPERATIONS BY 50% AND 25%, RESPECTIVELY BY 2030

5. EXPAND AND PROTECT GREEN AND BLUE SPACES

- INCREASE COMMUNITY-WIDE TREE CANOPY TO 30% COVERAGE BY 2030. [COMMUNITY RECOMMENDATION ✓]
- ENSURE THAT ALL COUNTY FACILITIES WITHIN THE URBAN DEVELOPMENT BOUNDARY (UDB) (PER 2013 DELINEATION) SHALL ATTAIN AN AVERAGE OF AT LEAST 30% CANOPY COVERAGE AND ALL COUNTY FACILITIES OUTSIDE THE UDB SHALL ATTAIN AN AVERAGE OF AT LEAST 50% CANOPY COVERAGE BY 2030
- REDUCE POLLUTANT LOADS TO SURFACE WATERS, INCLUDING BISCAYNE BAY, TO FACILITATE RECOVERY OF SEAGRASSES TO HISTORIC LEVELS [COMMUNITY RECOMMENDATION ✓]
- DOUBLE THE TOTAL NON-WETLAND ACREAGE OF NATURAL HABITAT IN PRESERVATION

WATER & WASTE

6. CONVERT WASTE TO ENERGY

- 48 GWH/YEAR OF ELECTRICITY FROM COGENERATION AT WASTEWATER PLANTS BY 2030
- 50% OF NON-RECYCLED GARBAGE CONVERTED TO ENERGY BY 2030
- 10% INCREASE IN RECYCLING RATES AND CUT NON-RECYCLABLES "CONTAMINATION" IN HALF

7. REDUCE WASTE AND WATER USE

- REDUCE LANDFILL WASTE PER PERSON 50% BY 2030
- REDUCE WATER CONSUMPTION PER PERSON 30% BY 2030

SEVEN APPROACHES WORKING TOGETHER TO IMPROVE QUALITY OF LIFE

Implementing the Climate Action Strategy to slow climate change will improve the quality of life for the Miami-Dade County community, resulting in cleaner air and water, less exposure to extreme heat, and new jobs in the low-carbon economy. Image 4 is a representation of low-carbon solutions in Miami-Dade County.

Artist rendering of a vision of Climate Action Strategy approaches working together to create resilient, active, and healthy urban center.

LAND ACKNOWLEDGEMENT

Miami-Dade County acknowledges that our community is located on land that is the ancestral and traditional territory of the Tequesta, the Miccosukee Tribe of Florida, and the Seminole Tribe of Florida. We pay respect to their Elders past and present and extend that respect to their descendants and to all Indigenous people. We recognize the ongoing relationships of care that these Indigenous Nations maintain with this land and extend our gratitude.

EQUITY AND ENGAGEMENT OVERVIEW

From May to July of 2021, the County solicited input from the community on this Strategy. Building on the community engagement models of the Thrive305 survey and Civic Week, the Office of Resilience hosted five virtual discussions with community members in collaboration with the CLEO Institute and the Miami Climate Alliance. Spanish and Haitian Creole language interpretation were available for each of the public meetings and the meetings were recorded and shared online.

Each of the virtual meetings focused on specific topics reflecting key sections of the Draft Climate Action Strategy including, energy and buildings, transportation and land use, and waste and water management. In total, 671 stakeholders registered for the five meetings and 304 attended. The recordings of the meetings were sent to all who registered so people could watch at a later date if they were not able to attend or wanted to review the discussion.

In addition to the community meetings, the Office of Resilience developed a short survey to solicit feedback on the community's perceived opportunities and challenges in moving to a healthy, equitable, low-carbon future. The survey was available in English, Spanish, and Haitian Creole, with 493 stakeholders responding to the survey.

The community engagement and interest in this Strategy would not have been possible without the help of many local non-profit partners in the Miami-Dade Community. The CLEO Institute was a key partner in promoting civic engagement and also as partners for the virtual meetings where staff from their organization opened each meeting with a Climate101 mini lesson. The Office of Resilience also worked with the following organizations to spread the word about the meetings and survey: American

Institute of Architects, Catalyst Miami, Coalition for Clean Cities, Dream in Green, Family Action Network Miami, Florida Immigrant Coalition, Florida Rising, Miami Climate Alliance, Sun Florida, and We Count.

The Office of Resilience also worked with other County departments on outreach including Community Action and Human Services, Cultural Affairs, Libraries, Parks Recreation and Open Spaces, Solid Waste, Transportation Planning Organization, Transportation and Public Works, Water and Sewer, and the Office of the Mayor.

In the meetings and as part of the survey, stakeholders were asked to imagine their lives in 2030 (the year for which the County has set the goal of 50% greenhouse gas emissions from the 2019 levels). The general themes reiterated by the majority of participants included their hopes for a future with more access to green spaces, compact development along transit corridors, bike and pedestrian friendly neighborhoods, more electric vehicles and charging stations, improved public transportation (and better coverage), flex working/tele commuting policies, and more widespread and accessible solar energy for residential and commercial buildings.

Imagine your life in 2030. In a few words, what is it like in terms of your community, job, housing, and general lifestyle? "A lot more live, play, work types of developments with nature incorporated into the architecture/design of mixed-use spaces. Ideally more public transit routes using our electric metro lines. Better drainage and less spilling into the bay so that we can keep it clean and enjoy the water. More parks with better facilities. More housing so we have more inventory and residents can actually afford rent. Ideally, more tech jobs in Miami-Dade and better companies so residents can find jobs at companies that offer better benefits." - Miami-Dade County Climate Action Strategy Survey respondent.

The survey also asked stakeholders to identify perceived barriers to climate action. This information is particularly helpful as the County works to implement climate mitigation measures in an equitable way across the entire County ensuring that no one is left behind and that historic inequities are addressed.

When asked what the largest barrier to adoption/expansion of solar energy was, 46% of respondents said cost was the main consideration holding them back from going solar. When asked the same question about the adoption/expansion of electric vehicles, 47% responded they are too expensive.

What is the biggest barrier to expanding your use of solar energy? "Home solar is expensive and old. Federal and State rebate programs would help if they offered residents and businesses incentive to invest." - Miami-Dade County Climate Action Strategy Survey respondent.

When asked what the biggest barriers to reducing water use and waste were, the majority of respondents said that lack of information was holding them back. Educational campaigns in these areas will be important moving forward.

What is the biggest barrier to reducing waste? "Miami's waste strategy needs to be completely reimagined. We need to reduce single use plastics, make large events on public property adhere to sustainable event practices (make the rules, explain the rules, and help them meet the rules), and then do a much better job reclaiming the valuable materials and reduce littering. We also need better pollution controls and maintenance on our or water systems to prevent the trash from escaping into Biscayne Bay!" - Miami-Dade County Climate Action Strategy Survey respondent.

The biggest perceived barriers to implementing both energy and water efficiency measures in homes and businesses were almost evenly distributed between lack of information, lack of leadership, and cost barriers.

These barrier questions illustrate the perceived roadblocks preventing our community from moving forward on important climate actions and should be prioritized as the County develops resilience and climate policies. It is imperative for the County provide the community with readily available, accessible, and engaging information about these topics, while also addressing cost barriers to adopting new technologies. In addition, County government will continue to lead by example with more bold action.

Besides engaging the community through the virtual meetings and the survey, the Office of Resilience also worked with the business community, focusing on large emitters of greenhouse gases and major employers including hospitals. The Office of Resilience also interacted with the 34 municipalities in the County through targeted briefing sessions.

CENTERING EQUITY

Miami-Dade acknowledges the impacts that historic and current structural racism and inequality have had on our community and commits to creating more just outcomes. Using Resilient305 as a framework, this strategy aims to build Miami-Dade County's capacity to address the causes of climate change so that our actions are effective and equitable for all of our residents, today and in the future.

Miami-Dade is striving to create a more effective and equitable government by ensuring that through our Climate Action Strategy and other efforts we:

- Examine power dynamics and biases in ourselves and our government systems and actively work to address them.
- Create a more transparent government.
- Ensure accessibility of resources and information to everyone in our community.
- Listen to and elevate the voices and stories from the diverse range of communities within Miami-Dade County, with an increasing focus on those who have historically experienced discrimination, including Black, Hispanic, and Indigenous communities.

In alignment with the South Florida Regional Climate Change Compact[3] (Compact), equity is defined as just and fair inclusion. The goals of equity are to create conditions that allow all individuals and communities to reach their full potential to the benefit of the individual and the larger regional community. An equitable community is one in which all can participate and prosper in their communities and in the economy, and where benefits and burdens are shared fairly. Equity considerations include economic status, age, race, ethnicity, and accessibility for those with disabilities, among other concerns.

Although both the survey and the meetings were available and advertised in multiple languages through newsletters, social media posts and ads, and email invitations, the attendees and respondents to the survey did not fully reflect the diversity of Miami-Dade County. Overall, those who participated in the survey tended to be wealthier and older, with Black and Hispanic minorities under-represented in the poll results, compared to the average for Miami-Dade County.

Recognizing that the community engagement was not as inclusive as desired, the Office of Resilience will continue to expand these conversations, especially among under-represented groups, as the Climate Action Strategy is implemented. This will ensure that all work is more reflective of the diversity of the County and will build on the partnership and relationships already forged through this effort. The Office of Resilience will also continue to consult and partner with the County's Office of Equity and Inclusion to ensure maximum participation in future work.

To advance equitable outcomes and report progress towards these goals, review of this work will be conducted on a continuing basis and in collaboration with internal and external stakeholders to ensure

COLLABORATING FOR CLIMATE ACTION

Local municipal governments within Miami-Dade County have learned over the decades how to work across jurisdictional boundaries most to more quickly recover and bounce back from South Florida's recurring tropical cyclones, also known as hurricanes. Collective response has been critical in dealing with the aftermath of these events and other events of acute shocks in our community. This same spirit of collaboration and collective action is needed to confront the coming climate impacts and to reduce community-wide greenhouse gas emissions.

While the bold actions proposed in this Climate Action Strategy will require concerted efforts across all sectors of the community, local governments must lead by example and enact legislation and policies that help facilitate swift action towards meeting these goals. Confronting climate challenges head on, many of the 34 municipalities throughout the County already leading the way, setting targets and taking action

but there remains work to be done. Leveraging the Resilient35 in the 305 network (Action 46, Resilient305 Strategy), the County will work with municipalities to identify opportunities to collaborate on projects and funding while also helping build capacity and knowledge sharing across the network to avoid duplicative efforts. Developed during the Resilient305 Strategy process, the Resilient35 in the 305 network facilitates knowledge sharing and network building on resilience issues among the 34 municipalities and the County.

Utilizing information from the Southeast Florida Regional Climate Change Compact Climate Assessment Tool and insights obtained during informational sessions on the County's Sea Level Rise Strategy and draft Climate Action Strategy, the Office of Resilience will work collaboratively with municipalities on helping accelerate implementation of the bold actions outlined in this plan while also helping celebrating successes along the way. Uniting as a Resilient35 in the 305 coalition also helps accelerate the pace and impact of our collective efforts in reducing greenhouse gasemissions. Having a plan and being prepared also better positions the work for future State and Federal funding opportunities as both levels of government begin prioritization of climate related activities. Advancing action on climate is difficult both politically and financially, but, similar to storm recovery, multijurisdictional collaboration will help make the journey a little less burdensome in our Miami-Dade County community.

Map of Resilient35 Network

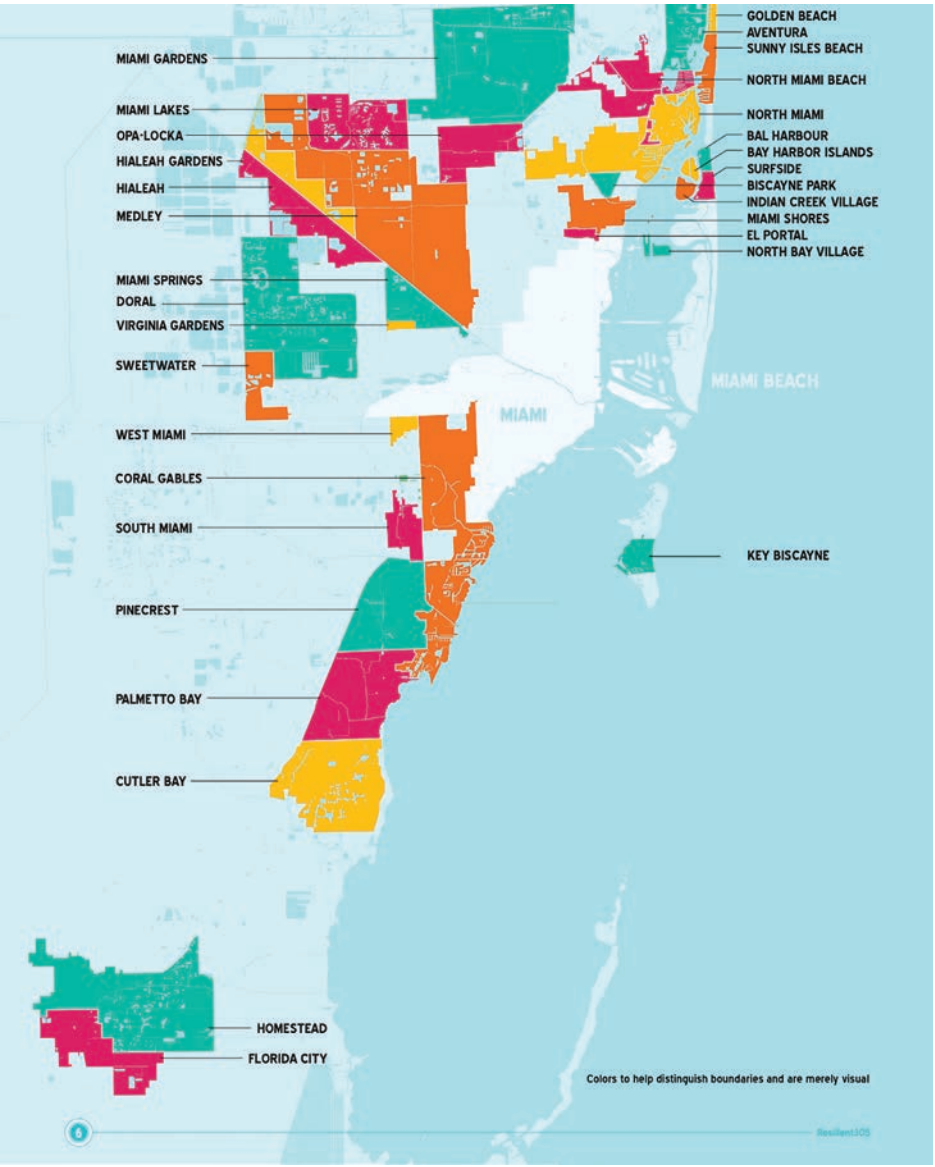
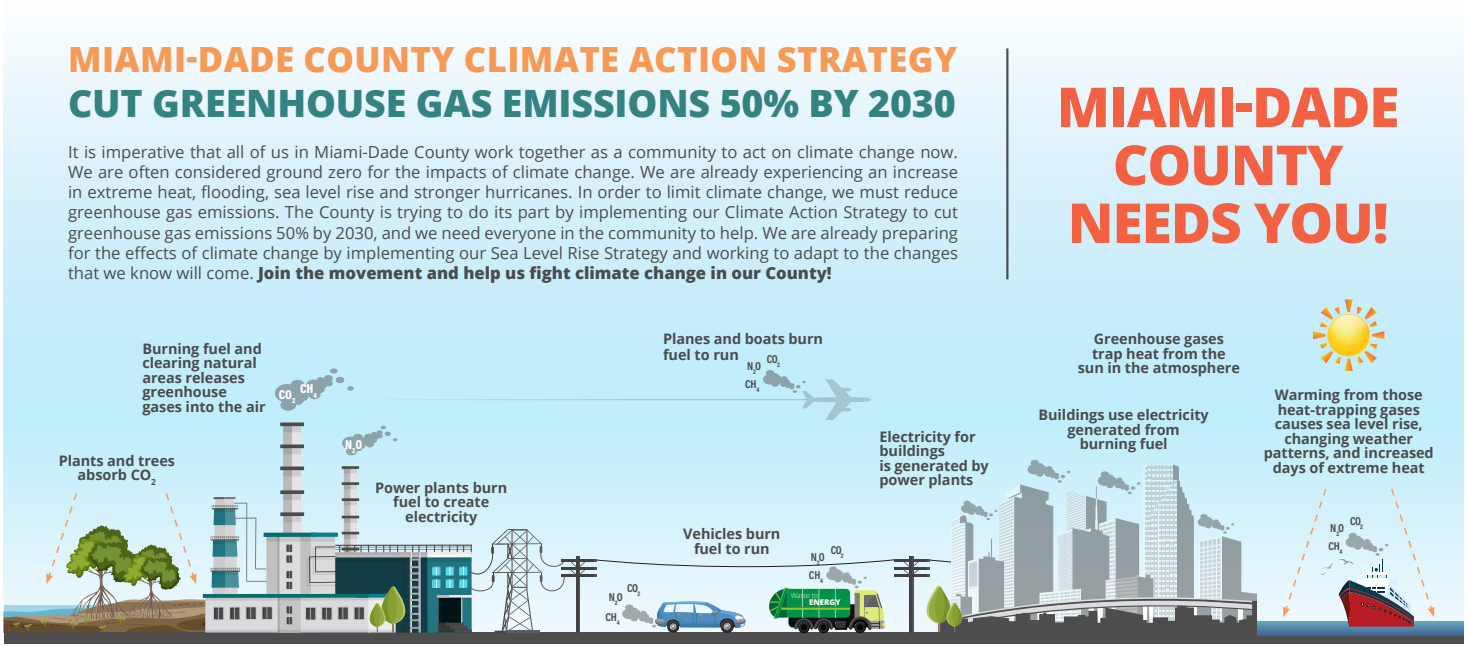


Figure 2



MIAMI DADE'S CURRENT AND FUTURE GREENHOUSE GAS EMISSIONS

MIAMI-DADE COUNTY'S HISTORY OF CLIMATE ACTION AND EMISSIONS TRACKING

Miami-Dade County has long been a recognized leader for its commitment to reduce greenhouse gas (GHG) emissions and has implemented numerous programs and policies to mitigate GHG emissions over the last 30 years. This includes programs such as the original Long-Term CO2 Reduction Plan (1990), the creation of the Climate Change Advisory Task Force (CCATF; 2006), membership in the Chicago Climate Exchange (CCX) pilot program (2007), participation in the U.S. Cool Counties Program (2008), and the joint establishment of the Southeast Florida Regional Climate Change Compact (2009). This history of participating in bold climate change programs has led up to the County's current commitments, established in April 2021, to the United Nations Framework Convention on Climate Change Race to Zero Program, which is the guiding framework for the targets, actions and commitments presented in this Climate Action Strategy.

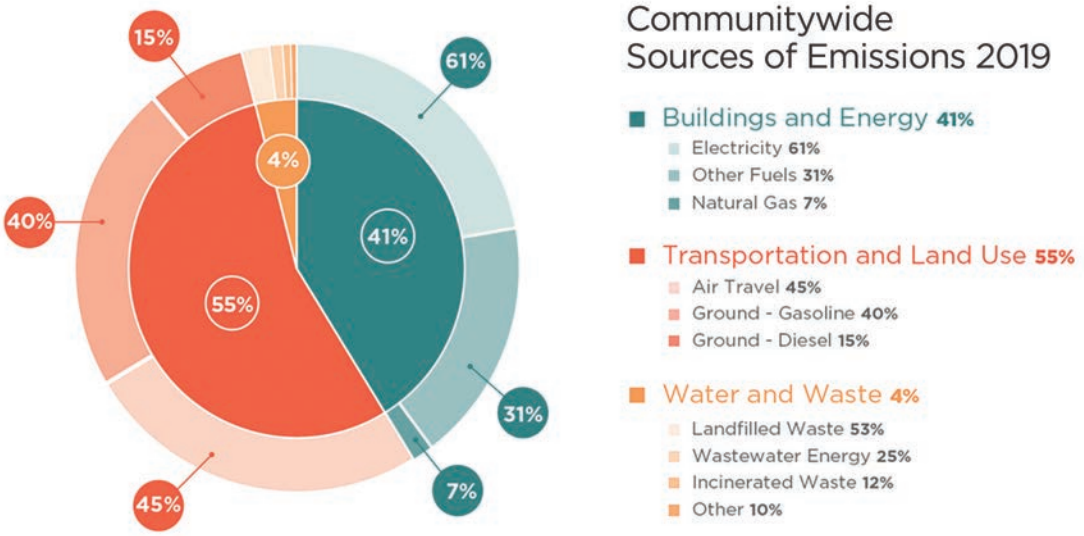


Figure 3

While these programs have helped to guide Miami-Dade's action on climate, the County's GHG emissions inventories serve as critical measurement tools to help achieve measurable, data-driven emissions mitigation efforts across all sectors of the community and economy. GHG inventories have two main objectives: measure total annual GHG emissions released in Miami-Dade County; and estimate the GHG reduction impact of proposed carbon mitigation actions. For the CAS, the 2019 GHG emission inventory provides the starting point while the GHG emission forecast shows the potential reduction in GHG emissions assuming full implementation of all approaches outlined in the Strategy. Miami-Dade County has been measuring and tracking GHG emissions since the first Community-Scale Emissions Inventory was completed in 1988. Going forward, this robust greenhouse gas emissions inventory process will be used to measure and verify progress towards the targets outlined here.

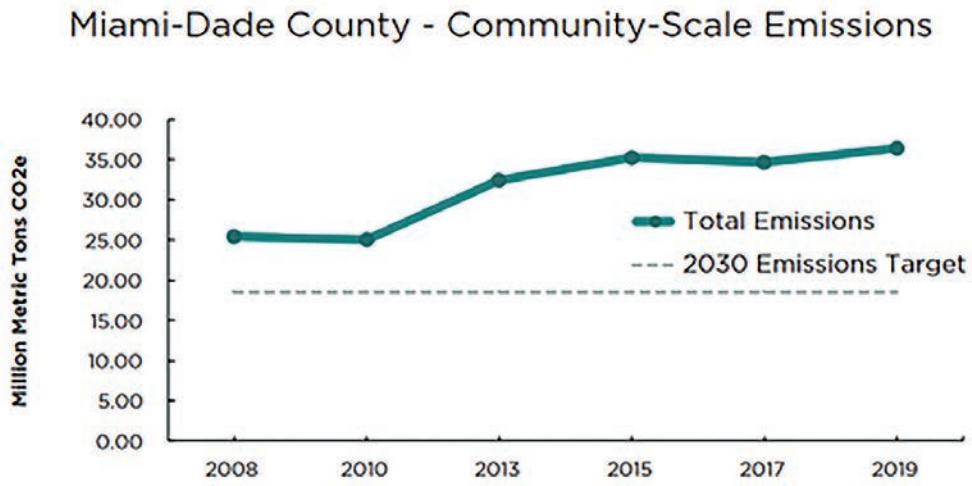
EMISSIONS INVENTORY – RESULTS OVERVIEW

An important part of establishing and reaching climate goals is understanding the past and current state of GHG emissions in our community. While the County has a long record of GHG emissions data, this Climate Action Strategy builds on the 2019 Community-Scale GHG Emissions Inventory. Data from this inventory serve as a snapshot in time, characterizing the entire community's emissions in calendar year 2019 and establishing a baseline for the GHG emissions targets presented in this strategy. Progress towards the targets and actions identified here will be measured against this baseline.

The 2019 Community-Scale GHG emissions inventory indicates that energy use in buildings and fuel use from transportation activities continue to be the two biggest sources of GHG emissions in Miami-Dade at 41% and 55% of all GHG emissions, respectively (Figure 3). While emissions related to water use and waste generation are a relatively small proportion of the County's emissions profile,

these sectors are a critical source of methane (CH_4), a greenhouse gas with one of the highest global warming potential values, trapping 25 times more heat in the atmosphere than carbon dioxide does. The total Community-Scale GHG Emissions for 2019 was 36.5 million metric tons of carbon dioxide equivalent (MMT CO_2e).

Taking the 2019 Community-Scale inventory into our broader historical context, GHG emissions have increased 43% between 2008 and 2019, from 25.5 to 36.5 MMT CO_2e, respectively (Figure 4). These changes have largely been driven by increases in emissions from the transportation sector as both population and economic activity have continued to grow. However, interpreting the reasons behind the changes in emissions data over time can be difficult due to changes in inventory scope and methodology. For example, a change in inventory methodology between 2010 and 2015 resulted in a more holistic accounting for transportation emissions, which appears in the emissions data as a large increase between inventory years. Finally, while the net trend for Community-Scale Emissions has been an overall increase since 2008, per capita emissions have held relatively constant since 2013, indicating that the amount of greenhouse gas emissions generated per resident is largely staying the same (Figure 5).



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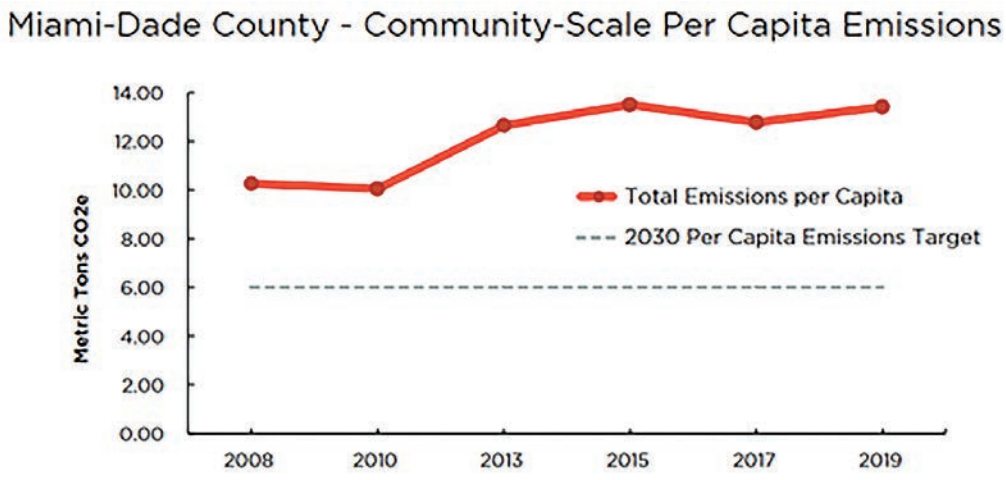


Figure 5

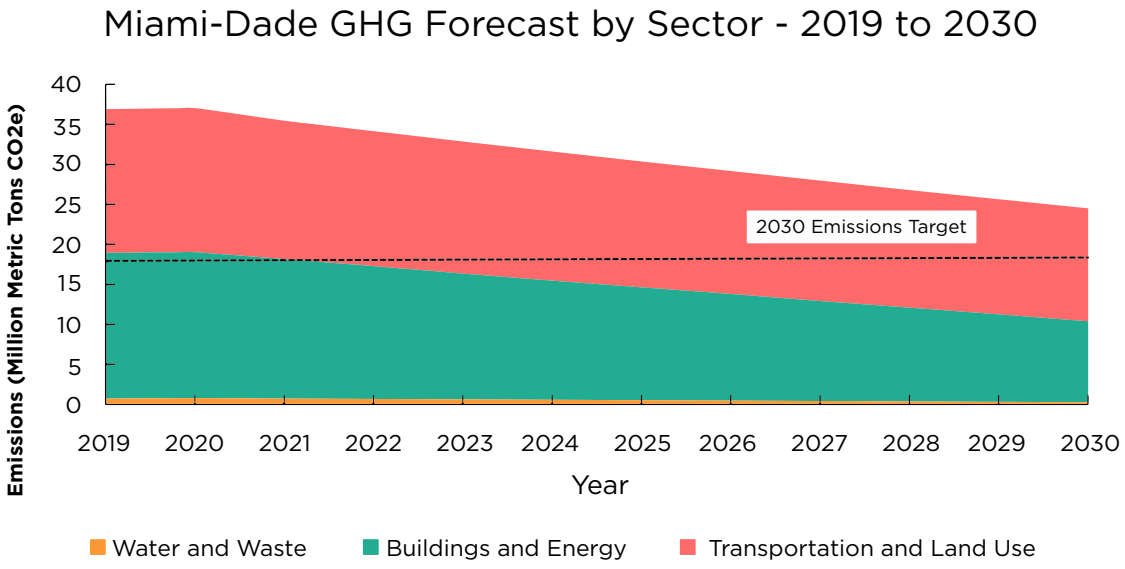


Figure 6

LOOKING FORWARD: GREENHOUSE GAS EMISSIONS FORECASTING

Meeting the ambitious emissions reductions goals laid out in this Strategy requires a comprehensive understanding of the emissions reduction potentials of various activities such as reducing the number of people driving cars or reducing electricity use in buildings in Miami-Dade County.

To estimate the impact of emissions reduction activities, the County first creates a baseline forecast that projects a "business-as-usual" scenario in which demographic and economic changes are the drivers of changes in emissions. This scenario does not include any implementation of the approaches proposed in this Climate Action Strategy. These basic growth assumptions result in a baseline scenario in which emissions steadily increase over time as population and economic activity continue to grow. Other key inputs to the baseline forecast scenario are known future changes in the emissions generated by the electricity grid and known future changes in vehicle fuel efficiency.

From this baseline, the suite of emissions-reducing targets outlined in this Strategy are applied to the forecast to generate a scenario that represents the impact of fully implementing the Climate Action Strategy. Each emissions reduction approach varies in the sectors it targets (for example - renewables address energy use in buildings) as well as their intensity and duration. This collection of emissions reduction targets together represents the County's planned emissions trajectory through 2030 and, ultimately, 2050. However, all emissions trajectories beyond 2050 are represented as a dashed line due to challenges and uncertainty in data availability and quality for future emissions factors and growth rates past 2030. For example, changes to national climate or clean energy standards could result in significant changes to Miami-Dade's emissions forecast.

A key conclusion from the forecast scenarios presented here is that fully implementing the Climate Action Strategy is integral to putting the County on a pathway to net-zero emissions. In addition, the County's planned emissions reduction approaches do not currently meet the interim 2030 emissions reduction target. The current suite

of proposed approaches will decrease emissions by 33%, or 11.9 MMT CO_2e, by 2030 from our 2019 baseline. The remaining GHG emissions "gap" represents a critical opportunity where additional bold actions by County government, continued community input, new technologies, and improvements in environmental standards and regulations at the state and federal level can help Miami-Dade fully realize it's climate goals.

BEYOND THE CLIMATE ACTION STRATEGY

Looking beyond the release of Climate Action Strategy, Miami-Dade is committed to continuing to produce and update its GHG emissions inventories on a regular basis. This includes close collaboration with our municipalities and regional partners to continue to improve the alignment of GHG emissions methodologies and data to provide a clear picture of South Florida's climate work. The County will build on the target-based forecasting scenarios presented here by monitoring the real-world implementation of the Climate Action Strategy and reporting on future emissions reductions and progress towards climate goals. This approach will be critical given the impact that actions beyond the County's control have on our GHG emissions trajectory. As an example, many of the actions proposed here by Miami-Dade County follow broader national trends towards an increased reliance on electricity as a power source. This is best captured by the growing adoption of electric vehicles, which shifts the source of emissions from "tailpipe" fossil fuel combustion to the electricity grid. Critically, then, our ability to reduce emissions will be increasingly tied to decisions by State regulators and utilities regarding the fuel sources used to power the electricity grid. Changes to utility practices, as well as additional environmental regulations related to buildings, transportation, and waste, are driven by state and federal government policy decisions. Miami-Dade will continue to update both our emissions inventories and forecasts to reflect the latest developments in standards, best practices, or regulations related to the utility electricity grid, vehicles, and buildings.

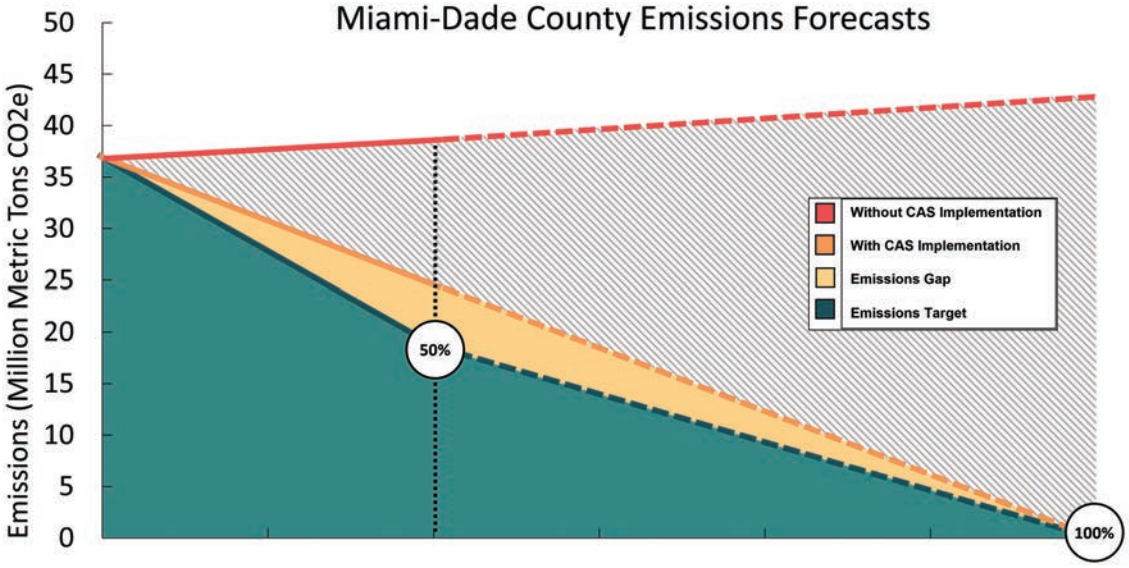


Figure 7

CLOSING THE GAP

Action: To identify solutions to close the emissions gap, Mayor Daniella Levine Cava will convene meetings with multiple South Florida governments, utility providers, schools, businesses, and institutions that have set aggressive greenhouse gas reduction goals.

The Climate Action Strategy aims to cut communitywide emissions 50% by 2030. Even if all targets in each of the seven approaches are achieved, an emissions gap will remain. The primary sources of that gap are emissions from the electric grid and fuel for vehicles, especially airplanes. Closing the gap will take transformative collaboration with state and federal governments and the private sector. No one industry or government has all of the solutions today. We must create them together.

Based on current plans, carbon free electricity from the grid will increase from 28% in 2022 to 38% in 2030, when more than 61% will still be produced by methane intensive natural gas, see Figure 8. Reducing emissions from the grid will only be achieved through partnerships with utilities that deliver electricity and gas to our community. Miami-Dade County stands ready to pursue any and all opportunities to cut emissions by developing renewable, clean sources of energy including established technology like solar and emerging solutions like green hydrogen and battery storage.

As the owner of a major international airport and seaport, Miami-Dade County plays a critical role in accelerating the decarbonization of air and sea travel. We hope to be the testing ground for launching new carbon free transportation solutions with airlines, cruise lines, and the shipping industry.

Meeting the multiple challenges of this historic moment will take the combined brilliance of our universities, entrepreneurs, utilities, financial institutions, government employees, and residents. Together the gap can be closed by building a smart electric grid powered by clean energy that is paired with massive investments in building efficiency and electrification of transportation.

Miami-Dade Electricity Grid Fuel Sources 2022-2030[4]

		FORECASTED YEAR								
Energy Source	Units	2022	2023	2024	2025	2026	2027	2028	2029	2030
Other	%	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1	0.8
Coal	%	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Natural Gas	%	70.9	70.3	69	67.5	66.5	65.2	63.4	62.4	61.4
Nuclear	%	21.3	20.8	20.5	20.7	20.3	20.2	20.3	19.7	19.5
Solar	%	5.8	6.9	8.4	9.8	11.2	12.7	14.4	16	17.5
Wind	%	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7

Figure 8

GREENHOUSE GAS METHODS AND DATA VERIFICATION

The County's ability to measure its emissions, take effective action, and monitor progress towards emissions goals depends on maintaining a robust emissions data set and inventory methodology. Miami-Dade County practices credible GHG accounting as required by the Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC). Following these standards ensures that Miami-Dade County's emissions inventories are robust from the beginning and enables the County to stand peer-to-peer with communities and municipalities utilizing the GPC standard in Florida and across the world. With more than three decades of inventory experience, the County has refined its methods over time to ensure inventories are thorough and include all critical emissions sources.

The County conducts two types of greenhouse gas emissions inventories: Community-Scale Inventories and Government-Scale Inventories. The Community-Scale Inventory includes all emissions activity occurring within the geographic boundaries of Miami-Dade County. This scale is useful in assessing the effectiveness of community- or county-wide programs across a variety of sectors. In contrast, the Government-Scale Inventory is focused on understanding emissions related to County government operations, such as County building and fleet operations. This supplement to the Community Inventory helps County government act as an emissions reduction leader and identify the effectiveness of policies that target emissions specific to government operations. All emissions data presented in this document are derived from the 2019 Community-Scale Inventory.

Miami-Dade County conducts its GHG emissions inventories using ClearPath, a cloud-based emissions management tool developed by the International Council for Local Environmental Initiatives (ICLEI). ClearPath is designed around the Local Government Operations Protocol and US Community Protocol and supports reporting under the GPC standard to facilitate credible emissions accounting and reporting. In addition, the County uses ClearPath to forecast future emissions scenarios, set mitigation goals, create targeted climate action plans, and track progress over time. In this Climate Action Strategy, Miami-Dade County reports GHG emissions totals in CO_2 equivalent, or CO_2e, a metric standard of emissions measurement that is used to aggregate emissions from a variety of greenhouse gases (GHG) such as NO_2, CH_4, and CO_2 on the basis of their common global-warming potential. Miami-Dade County reports emissions in CO_2e to enable standardized understanding of impacts of all greenhouse gases accounted for in the inventory process. Once complete, Miami-Dade County's greenhouse gas emissions inventories undergo third-party verification by technical advisors at ICLEI. ICLEI staff assist Miami-Dade in conducting quality assurance and quality control reviews of inventories before they are marked as verified and complete. This additional level of verification adds independent rigor to the County's emissions accounting.

Finally, a key part of this process is the establishment of emissions reduction targets. Generally, Miami-Dade's GHG emissions reduction progress has historically been measured against the County's emissions levels in 2008, the baseline established by the Board of County Commissioners through the County's Comprehensive Development Master Plan (CDMP) (Figure 9). Building on these goals and in line with the County's participation in the Race to Zero program and other commitments, this Climate Action Strategy reframes our targets to focus on a more ambitious 50% reduction of GHG emissions by 2030 from a 2019 baseline level, with an overall goal of net-zero emissions by mid-century (2050) (Figure 7).

MIAMI-DADE COUNTY EMISSIONS, ELECTRICITY, AND FUEL REDUCTION GOALS IN THE COMPREHENSIVE MASTER DEVELOPMENT PLAN (CDMP)
Achieve 80% community-wide emissions reduction by 2050 from baseline year of 2008.
Reduce the consumption of gasoline in County operations by 30% and the consumption of diesel fuel in County operations by 70% from the baseline year of 2016 by 2028 and further move toward conversion of the County's fleet to electric vehicles.
Reduce electricity usage for County facilities by 20% from the baseline year of 2009 by 2025.
Incorporate green building practices into the design of County facilities and infrastructure (Sustainable Buildings Program).
Have 30% of county-wide energy obtained from solar by 2030 with the ultimate goal of achieving zero emissions for county-wide energy sources

Figure 9

The recently remodeled LEED certified Aventura Branch Library, the County's first "green" library.

ENERGY & BUILDINGS

APPROACH 1:

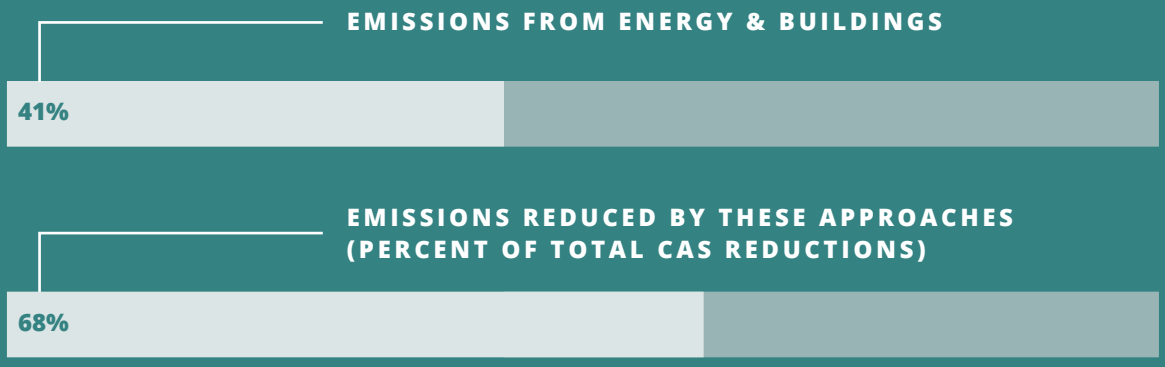
BENCHMARK, RETUNE, AND RETROFIT EXISTING BUILDINGS

APPROACH 2:

EXPAND RENEWABLE ENERGY GENERATION

APPROACH 3:

BUILD ULTRA-LOW ENERGY BUILDINGS



ENERGY & BUILDINGS

Buildings provide the base for our homes and businesses. As the pandemic highlighted, having efficient healthy homes and properties is paramount to our own personal health and well being. In Miami-Dade County most buildings run on electricity, with a very small percentage that use a combination of electricity and natural gas (primarily composed of methane), a fossil fuel that is 25 times as potent as carbon dioxide in trapping heat in the atmosphere.

The electricity and fuel used in buildings produces 41% of emissions community-wide, according to the 2019 Community-Scale inventory. Strategies to tackle emissions from buildings center around reducing energy use through improved efficiency, and ensuring that the energy needed comes from renewable sources, which include electrifying systems that currently use fossil fuels and using on-site or off-site sources of renewable energy such as solar panels and solar hot water heaters. In other words, the objective is to make buildings as efficient as possible to reduce energy usage, and then get the energy required for the buildings from solar panels or other renewable sources that do not burn fossil fuels.

Achieving this goal in both new and existing structures will require buildings to be electrified and renewable energy, like roof-top solar power, to be installed more widely across the community.

As numerous studies show, besides combating climate change, these actions will also tackle broader issues such as energy burden, housing affordability, extreme heat, and public health, which are inherently intertwined with energy. Well-maintained buildings use less energy, save money on utility bills, offer protection from extreme heat, reduce negative health outcomes such as asthma rates, and provide refuge during extreme weather events.

Solar Panels at Country Village Park producing an average of 41,000 kWh of electricity per year

Energy efficient buildings have also been demonstrated to alleviate high energy burdens, improve housing affability, and support more financial stability for tenants. In the Miami metropolitan area, 57% of low-income households face energy or utility burdens that are two or three times higher than that of other households. This means these households spend a significant greater percentage of household income to cover the costs of their electricity use or other utilities. This is especially true for low-income households with older adults or people with disabilities, and low-income households living in multifamily housing. A national study notes that "for African American, Latino, and renting households, 42%, 68%, and 97% of their excess energy burdens, respectively, could be eliminated by raising household efficiency to the median level[5]."

Reducing the impacts of energy burdens, improving building performance can mitigate both the causes and impacts of urban extreme heat. Heat is a growing threat to the health and economic wellbeing of Miami-Dade County residents, and will continue to increase in intensity in the coming years as the climate continues to change. For example, the average number of days above 90°F in Miami-Dade County has increased from 84 days per year in 1970 to more than 133 days per year in present day, and this number will continue to rise. Importantly, the impact of this increase in urban heat and extreme heat events is interconnected with other stresses and shocks, like hurricanes and extreme weather events, where adaptive measures like indoor cooling may not be available due to power grid failure. By reducing emissions, the strategies outlined here can help to reduce future heat production by buildings and the intensity of the local Urban Heat Island effect, as well as broader atmospheric warming processes driven by the greenhouse gas effect. In addition, proper weatherization and reliable cooling in buildings reduce the extent to which residents experience heat indoors, as well as the strain on households' utility bill. The strategies outlined here will work in synergy with additional planned heat mitigation activities that will be identified through Miami-Dade County's Heat and Health Task Force and related efforts..

Finally, energy efficiency and clean energy bring substantial health benefits. Properly sealed building envelopes and adequate ventilation reduce the instances of pests while also blocking moisture, air pollution, and other stressors that can cause or exacerbate health problems.

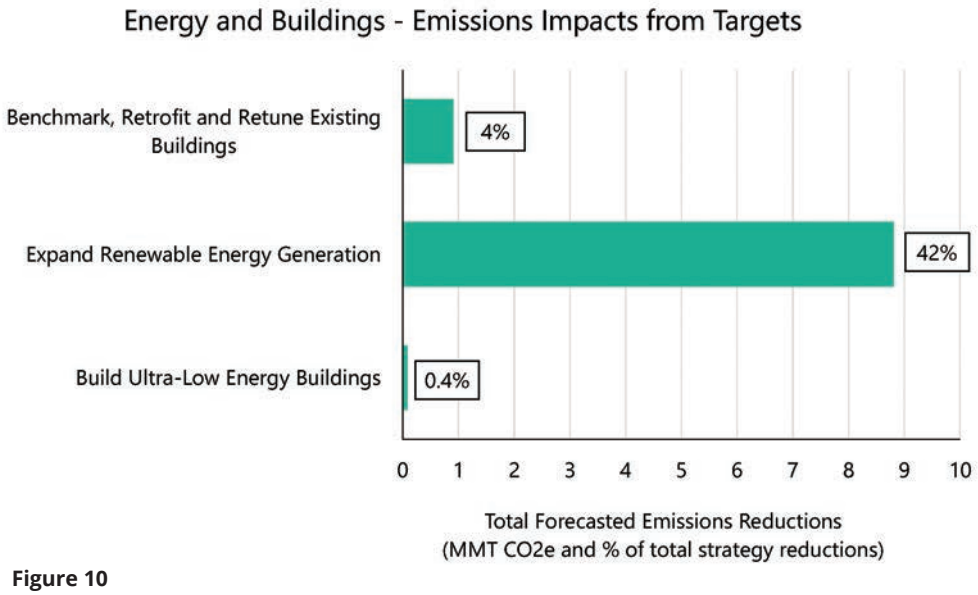


Figure 10

APPROACH 1:

BENCHMARK, RETUNE, AND RETROFIT EXISTING BUILDINGS

According to the 2019 Census, out of the 1.03 million housing units in Miami-Dade County, 82% were built before 2000[6], before the Florida Building Code was enacted in 2002. This means that much of the existing housing stock offers prime opportunities for energy efficiency and savings. Given South Florida's hot, humid climate, building envelopes and cooling systems are the main areas of interest.

In this environment, the top two strategies to enhance building performance and reduce energy waste are benchmarking and retuning or retro-commissioning.

A healthy, efficient building is especially critical for residents who experience a high energy burden and live in sub-par housing structures.

TARGETS

- Benchmark 1.3 billion square feet in communitywide buildings by 2026
- Retune 1.1 billion square feet in communitywide buildings by 2030
- Retrofit 167,500 homes to reduce energy costs 28%, prioritizing Low- to Moderate-Income (LMI) homes by 2030

CO-BENEFITS

- Save money
- Lower energy burden
- Reduce urban heat island
- Enhance air quality
- Improve health
- Increase storm and energy resilience
- Create jobs

BOLD ACTIONS

- Adopt a Building Performance Ordinance to ensure benchmarking and retuning of large existing buildings community-wide
- Expand weatherization assistance through repairs and upgrades to improve energy efficiency, safety, and comfort in Low to Moderate Income (LMI) housing

KEY FACTS

- 80% of the building stock was built before the Florida Building Code was enacted in 2002
- 27% of energy consumed in households is used for air conditioning[7]
- Miami-Dade County government is the number one customer of Florida Power and Light (FPL), purchasing approximately 1.2 billion kWh/year[8]

APPROACH 1:

BENCHMARK, RETUNE AND RETROFIT EXISTING BUILDINGS

Metric:

1. Number of buildings and square feet benchmarked
2. Number of large buildings (50,000 square feet or larger) retuned
3. Number of LMI housing retrofitted

According to the 2019 Census, out of the 1.03 million housing units in Miami-Dade County, 82% were built before 2000 before the Florida Building Code enacted in 2002. This means that much of the existing housing stock offers prime opportunities for energy efficiency and savings. Given South Florida's hot, humid climate, improvements should first focus on building envelopes and cooling systems.

In this environment, the top two strategies to enhance building performance and reduce energy waste are benchmarking and retuning or retro-commissioning.

Benchmarking refers to tracking energy use in a building over time. It establishes a baseline and facilitates observing consumption patterns as well as promoting data-driven decision making that ultimately leads to saving opportunities. Retuning - or retro-commissioning - refers to no-cost or low-cost conservation measures, such as small changes in operations and minor weatherization that result in immediate savings.

Winning a free audit of their energy and water usage, three lucky buildings and their owners participating in the Building Efficiency 305 (BE305) Challenge benefitted from an assessment of their current consumption patterns, which now provides a roadmap to improve efficiency and save money in the short- and long-term. Engineers performing the audit produced a detailed report including cost-effective conservation recommendations, many of which can be implemented immediately at little or no expense. Whether a building is new or old, large or small, opportunities for improvement abound.

In 2020, in celebration of Energy Efficiency Day, Miami-Dade County launched the Building Efficiency 305 Challenge (BE305 Challenge). The BE305 Challenge focuses on improving building performance and reducing operational costs. Over the course of the first year of the program, 8 virtual training sessions on energy and water conservation measures were provided to Challenge participants. Challenge participants were also provided with free one-on-one technical assistance tailored to their needs and unique buildings.

Many private companies, non-profit organizations, specialized networks, and other entities work in the home improvement market and energy management services. Miami-Dade County programs also help building and home owners learn more about energy monitoring and retrofits, including the Building Efficiency 305 (BE305) Program[9] managed by the Office of Resilience for large existing buildings; the Weatherization Assistance Program[10] and Home Rehabilitation Program[11] directed by the Community Action and Human Services Department for low-to moderate-income (LMI) households.

The BE305 program promotes improvements in building performance through a suite of strategies that increase energy and water efficiency in large, existing private and public buildings. The target audience is building owners and managers of buildings 20,000 square feet or larger, which represent about 12,200 buildings or approximately 43% of floor space in the entire County. One of the components of the BE305 program is the Building Performance Ordinance, which mandates benchmarking and retuning, also known as retro-commissioning.

Residents of low- and moderate-income (LMI) households are more likely to live in older, less efficient buildings that generate disproportionately higher energy bills while providing lower comfort levels. This leads to an "energy burden", when more of a household's income is allocated to cover energy expenses than is the norm for those living in better housing. Often, higher energy burdens correlate with higher incidences of asthma and other health conditions. Crises, such as the Covid-19 pandemic, elevate the role of safe, efficient, and healthy homes and buildings.

To address this issue, the County's Community Action and Human Services Department (CAHSD) offers the Weatherization Assistance Program (WAP) and Home Rehabilitation Program. The Weatherization Assistance Program is federally funded to assist low-income homeowners with making their homes energy efficient through the installation of cost-saving measures, such as insulation, and repair or replacement of lighting and air conditioning equipment. At the current federal funding level available in 2021, CAHSD retrofits about 48 homes per year, addressing energy, health, and safety concerns.

The Home Rehabilitation Program offers a forgivable loan to help low-income qualified single-family homeowners make repairs and improvements that are prioritized to eliminate health and safety issues, correct code violations, and ensure greater energy-efficiency.

One of the many important regional effort spearheaded by the Southeast Florida Regional Climate Change Compact will identify top energy saving actions for LMI residents located in Miami-Dade County and the other southeast Florida Compact Counties. As a result, this project will allow targeted outreach and a tailored engagement approach in collaboration with the Compact's partner organizations that support LMI communities.

Miami-Dade County actions:

- Pass Building Performance Ordinance for benchmarking and retuning large existing buildings
- Create a Quality Assurance Verifier position to support the guidelines and applicability of Building Performance Ordinance
- Expand the Weatherization Assistance Program [Community Recommendation ✓]
- Assess local rental housing and energy trends and create rental efficiency policies and programs [Community Recommendation ✓]
- Offer monetary and/or non-monetary incentives to promote building retrofits, starting with LMI buildings
- Update Miami-Dade County Government's Electricity Master Plan

APPROACH 2:

EXPAND ON-SITE AND OFF-SITE RENEWABLE ENERGY GENERATION

In 2020 Florida ranked 3rd nationally for total solar installed with most of the growth in solar installation attributed to utility investments in clean energy. Current options to source renewable energy locally are offered through FPL's Solar Together Program, solar cooperatives, solar leasing, and independently installing solar systems at buildings. Solar installations must dramatically increase to meet the energy needs of buildings.

TARGETS

- Install 61,725 kW of solar energy by 2030 on County buildings, land, and water equivalent to 7,498 homes' electricity use for one year
- Install 794,000 kW of solar energy by 2030 on commercial and residential buildings, equivalent to 104,014 homes' electricity use for one year
- Maximize participation in utility scale renewable energy programs

CO-BENEFITS

- Save money
- Lower energy burden
- Increase storm and energy resilience
- Enhance air quality
- Build the economy
- Create jobs

BOLD ACTIONS

- Install solar on as many County buildings as possible
- Support installation and financing of on-site solar for homes and businesses

KEY FACTS

- In 2020 Florida ranked 3rd nationally for installed solar power capacity
- State-wide, solar power generates on average 3.03% of Florida's energy needs[13]

APPROACH 2:

EXPAND ON-SITE AND OFF-SITE RENEWABLE ENERGY GENERATION

Metric:

1. Number of permits issued for solar installations
2. Capacity of solar photo-voltaic (PV) installed in kW

Renewable energy derives from sources that are naturally replenishing and virtually inexhaustible, such as biomass, hydropower, geothermal, wind, and solar[14].

In 2020 Florida ranked 3rd nationally for total solar installed and most of the growth in solar installation is due to utility investments in renewable energy. Current options for the community to source renewable energy locally are:

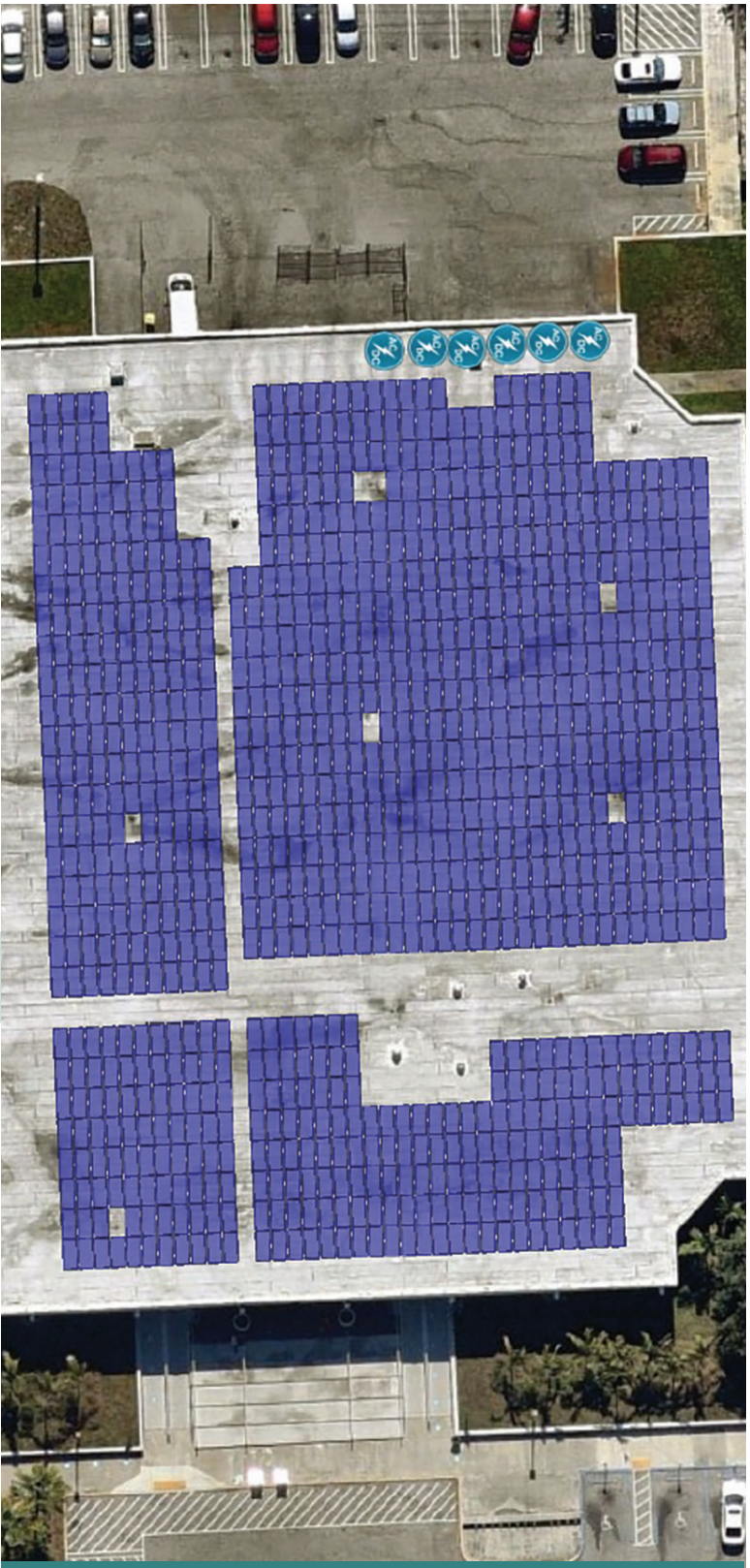
- Solar Together: A voluntary community solar program that will provide FPL customers the opportunity to support renewable energy while also receiving economic benefits in the form of monthly bill credits.
- Solar Cooperatives (co-ops): In June 2017, the Miami-Dade County Board of Commissioners passed a resolution in support of solar purchasing cooperatives.[15] Managed by nonprofits such as Solar United Neighbors, these co-ops facilitate economies of scale through bulk purchasing of solar photovoltaic equipment and contractor service.
- Residential solar leasing: Approved by the Public Service Commission in 2018, the regulation allows leasing of solar equipment, removing the barrier of high up-front cost.
- Independently installing solar systems at buildings.

Solar United Neighbors (SUN) Solar cooperatives take a community approach to organize neighbors to go solar in a group. Ten cooperatives have been completed in Miami-Dade County since the creation of a Florida program in 2016.

Miami-Dade County registered for the Solar Together Program which will offset up to 25% of the County's electricity usage from renewable sources and save $7 million over 10 years. In collaboration with the Rocky Mountain Institute (RMI) and the World Resources Institute (WRI), the County initiated a Feasibility Study in 2019 to install solar panels on County buildings. The second phase of the study will narrow down the current list of 238 County buildings, based on structural considerations, roof conditions, potential kW generation, and other factors. Options for solar installation include rooftop, ground-mounted, and floating solar.

Miami-Dade County's first foray into innovative floating solar arrays was completed in partnership with the local utility, Florida Power and Light (FPL), at the Blue Lagoon next to Miami International Airport. The half-acre, 402-panel site, generates 160 kilowatts of power, and prevents 165 tons of carbon dioxide emissions each year[16].

Aerial image of innovative floating solar panel array located at Miami International Airport and completed in collaboration between Miami-Dade County and Florida Power and Light.



Miami-Dade County's North Dade Regional Library is part of a group of three County facilities that will be receiving significant rooftop solar installations. The installation featured here will generate approximately 87% of the library's energy needs. Together with the South Dade Regional Library and the MetroWest Detention Center, this rooftop solar power package will save millions of dollars and kiloWatt-hours of electricity.

Compared to other states, Florida does not have a Renewable Portfolio Standard (RPS) requiring utilities to meet a certain percentage of their electricity sales through qualifying renewable energy credits. Moreover, Community Choice Aggregation (CCA) and Power Purchase Agreements (PPAs) are not allowed in the State. PPAs allow a third-party, such as a Renewable Energy (RE) developer, to build, own, and operate an RE system on behalf of a host customer. This model enables customers to avoid the upfront costs of distributed Renewable Energy (RE) installation and it allows tax-exempt entities (e.g., governments and non-profits) that do not have access to federal and state tax credits to leverage these incentives. CCA is a state policy that allows municipalities to select an electricity provider on behalf of their residents, businesses, and municipal accounts.

Changes in state and federal policies, including regulations to decarbonize the power sector nationally, would provide additional opportunities to promote the generation and consumption of renewable energy.

Miami-Dade County actions:

- Complete the installation of solar on County buildings as identified in the Solar Feasibility Study Phase 2
- Establish the Solar Energy Loan Fund program and similar financial mechanisms in Miami-Dade County ***Community Recommendation*** ✓
- Require new County buildings to be solar ready for the County to lead by example ***Community Recommendation*** ✓
- Cut soft costs for installing on-site solar energy ***Community Recommendation*** ✓
- Execute an agreement with the United States Department of Energy's National Renewable Energy Laboratory to pursue mutually beneficial projects to reduce greenhouse gas emissions.

APPROACH 3:

BUILD ULTRA-LOW ENERGY BUILDINGS

New construction built today will last several decades. Between 2010 and 2014 in Miami-Dade County, an average of 10.5 million square feet of floor space was added each year, increasing to 13.9 million square feet from 2015 to 2019.[17] This rapid growth signals the importance of incorporating energy efficiency in the design phase to lock in energy savings from Year One. Although retrofits are possible, it is cheaper to design structures with energy conservation features holistically integrated with all the various building systems working synergistically. Extremely efficient structures are called Ultra-Low Energy (ULE) or Zero Energy Buildings (ZEB). New construction must align towards becoming ULE or ZEB standards by 2030.

TARGETS

- Reduce energy use of new buildings 20% by 2030 below 2020 levels

CO-BENEFITS

- Save money
- Lower energy burden
- Enhance air quality
- Improve health
- Reduce urban heat islands
- Increase storm and energy resilience

BOLD ACTIONS

- All new County buildings will be Ultra-Low Energy by 2030
- Identify steps to transition to net-zero ready code

KEY FACTS

- Between 2011 and 2021, an average of 132 buildings have been constructed every year
- The 2021 International Energy Conservation Code, the basis for the Florida Building Code, improved efficiency standards for residential and commercial buildings by 10% compared to the previous version[18]

APPROACH 3:

BUILD ULTRA-LOW ENERGY BUILDINGS

Metric:

- Number and square feet of Ultra-low Energy buildings
- Source Energy Use Intensity (EUI)

Researchers, government staff and practitioners' efforts to improve energy efficiency in new homes have not only cut energy consumption and costs but also continue to improve design techniques creating synergies within energy systems. Although retrofits are possible, it is cheaper to design structures that have energy conservation features holistically integrated into the building where all the various building systems work in synergy. The goal is to have new construction be Ultra-Low Energy (ULE) or Net Zero Energy (NZE)[19]. Also commonly referred to as "zero net energy" or "zero energy", the latter building type produces as much energy as it consumes. Ultra-Low Energy (ULE)[20] buildings, also referred to as zero-energy ready, are energy-efficient buildings that could operate as zero-energy with the addition of on-site renewables. In Florida, 7 buildings are NZE verified, with two located in Fort Lauderdale.[21]

Building performance is often measured in energy use intensity or EUI which expresses a building's energy use as a function of its size or other characteristics. It is calculated by dividing the total energy consumed by the building in one year by the total gross floor area of the building. Commercial buildings built in 2020 have an average site EUI of 47. Approach 3 of the CAS proposes to reduce that value by 20% by 2030, to an average EUI of 37.6. To achieve the ultimate goal of zero energy, buildings will have to be about 50%, more efficient than today, with performance target ranging from 20 EUI for a low-rise apartment, to 24 for a medium-office, to 28 for a high-rise apartment.

Community-wide, new construction follows the Florida Building Code (FBC), which is updated on a 3-year cycle and dictates efficiency standards. The FBC is based on the International Energy Conservation Code, which improved efficiency for residential and commercial buildings in its 2021 update by 10%, compared to 2018.

A key tool to support resilient buildings and demonstrate best practices is Miami-Dade County's Sustainable Buildings Program (SBP). Since 2008, the SBP has required County construction projects to achieve the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) certification. Since its inception and as of 2022 the SBP has achieved over $3.7M and 100,000,000 kWh in energy savings, and is on track to achieve additional savings through 2030. In leading by example, the County hopes to demonstrate the energy, water and emissions savings that resilient buildings and infrastructure can achieve. The County's Office of Resilience is currently proposing changes to the SBP that would expand the program to formally require certification for qualifying infrastructure projects under the Institute for Sustainable Infrastructure (ISI) Envision certification, in addition to other revisions to expand and clarify compliance requirements.

In 2011 TD Bank built a Zero Net Energy retail bank branch in Fort Lauderdale. The 3,970 square-foot building include several energy efficiency features such as a high-performance envelope, high efficiency mechanical systems, and efficient lighting with dimming controls. Most important, 400 solar panels mounted on the roof produce more energy than the building consumes.

Miami-Dade County actions:

- Plan for the first ULE or NZE County building
- Offer monetary and/or non-monetary incentives to promote the construction of ULE or NZE buildings
- Organize a green building fair and competition to showcase technologies and innovations to facilitate new ultra-low energy construction ***Community Recommendation*** ✓
- Assess embodied carbon in new construction and create policies and programs to reduce it ***Community Recommendation*** ✓

LAND USE & TRANSPORTATION

APPROACH 4:

REDUCE TRANSPORTATION-RELATED FUEL CONSUMPTION

APPROACH 5:

EXPAND AND PROTECT GREEN AND BLUE SPACES

EMISSIONS FROM LAND USE & TRANSPORTATION

55%

EMISSIONS REDUCED BY THESE APPROACHES
(PERCENT OF TOTAL CAS REDUCTIONS)

28%

LAND USE AND TRANSPORTATION

Sustainable land use and transportation play vital roles in reducing greenhouse gas emissions in Miami-Dade County. Where people live, work, and spend their free time determines their commuting patterns and how they get around. The fuel burned from transportation activities related to these decisions is the source of more than half (55%) of community-wide GHG emissions, and is also a major source of other air pollutants. Transportation-related emissions result primarily from burning fossil fuels to power cars, trucks, planes, boats and ships, and mobile equipment such as construction machinery, farm tractors, and even lawn mowers or leaf blowers. Because transportation is a key economic driver, many municipal, County, state, and federal stakeholders involved in transportation decisions, including such entities as the U.S. and State of Florida Departments of Transportation, and local transportation agencies. In Miami-Dade, the Comprehensive Development Master Plan (CDMP) guides land use and the Miami-Dade Transportation Planning Organization (TPO) Governing Board prioritizes transportation improvement projects for federal, state, and local funding.

Greenhouse gas emissions, such as those linked to transportation, can be partially offset by protecting and expanding land uses that are dedicated to natural areas. Wetlands, seagrass, trees, and even some farms can absorb and store carbon, providing societal benefits that are garnering more recognition in recent years.

While intricately linked, transportation, land use, and air quality considerations are often not equally prioritized and properly integrated into decision-making. Identifying and implementing strategic transportation and land use solutions that have economic, social, and environmental benefits can be very complex, and yet this work is critical to addressing the current climate change crisis.

The most well-known phenomenon in urban settings is the "Urban Heat Island Effect," which is driven by high concentrations of concrete and other heat-absorbing materials, and low concentrations of trees, vegetation, and shade. Extreme heat discourages the use of public transit, walking and biking and presents a public health risk to those who do use these modes of transportation. Internal combustion vehicles further contribute to urban heat island issues. For these reasons, careful consideration of heat exposure needs to be integrated into land use and transportation policies and plans and streetscape designs.

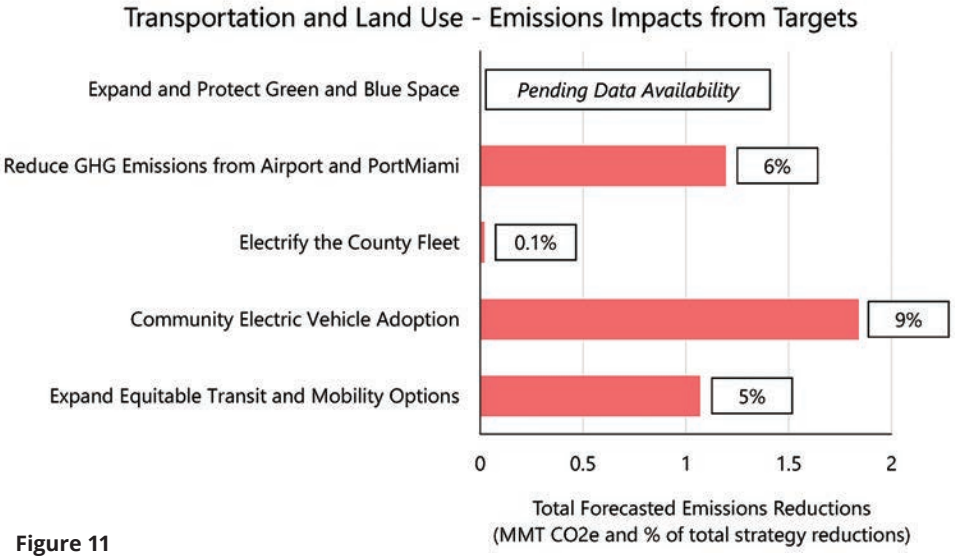


Figure 11

APPROACH 4:

REDUCE TRANSPORTATION-RELATED FUEL CONSUMPTION

Reducing transportation-related fuel consumption will have the largest single impact on communitywide emissions in Miami-Dade County and requires multiple strategies, including reducing vehicle and mobile equipment usage, expanding effective low-carbon mobility options, accelerating the electrification of vehicles and equipment, prioritizing those powered by renewable energy, and cutting emissions from Miami-Dade's seaport, airports, and other commercial hubs. All of these emissions reducing approaches provide multiple long-term economic, health, and climate benefits.

TARGETS

- Shift 10% of transportation mode away from single occupant vehicles by 2030
- Electrify the County fleet: 80% of light vehicles and 50% of buses by 2030
- Transition 30% of communitywide vehicles to electric power by 2030
- Reduce greenhouse gas emissions from Miami International Airport and PortMiami operations by 50% by 2030

CO-BENEFITS

- Increase productivity
- Build the economy
- Create jobs
- Save money
- Reduce traffic
- Reduce accidents
- Enhance air quality
- Reduce urban heat island
- Improve health
- Reduce noise
- Establish emergency backup power

BOLD ACTIONS

- Make walkability and safety a communitywide first priority ***Community Recommendation*** ✓
- Complete 50 miles of protected bike lanes in downtown Miami ***Community Recommendation*** ✓
- Work to ensure geographically dispersed and equitable public access to EV chargers that are EnergyStar certified and, whenever possible, use renewable energy
- Establish County policies to prioritize and double the installation of roundabouts instead of traditional street intersections by 2030.
- Build out SMART Plan corridors
- Implement the community-driven Better Bus Network

KEY FACTS

- Almost 50% of Miami-Dade County's approximate 900,000 households have zero or limited access to a car; 10% of households have no car and 38% have only one car.
- For the average household without a car, the number of jobs accessible by transit within 60 minutes would increase by 29% through implementation of the Better Bus Network.
- As of 2018, the average commuter in Miami-Dade loses more than 100 hours of productive time to congestion each year, and this costs roughly $4 billion in lost economic output.[22]
- Most electric vehicles (EV) are charged at home 80% of the time.
- Electric vehicles save the average Florida owner $763 to $1,259 every year, compared to a gas vehicle. [23]

APPROACH 4:

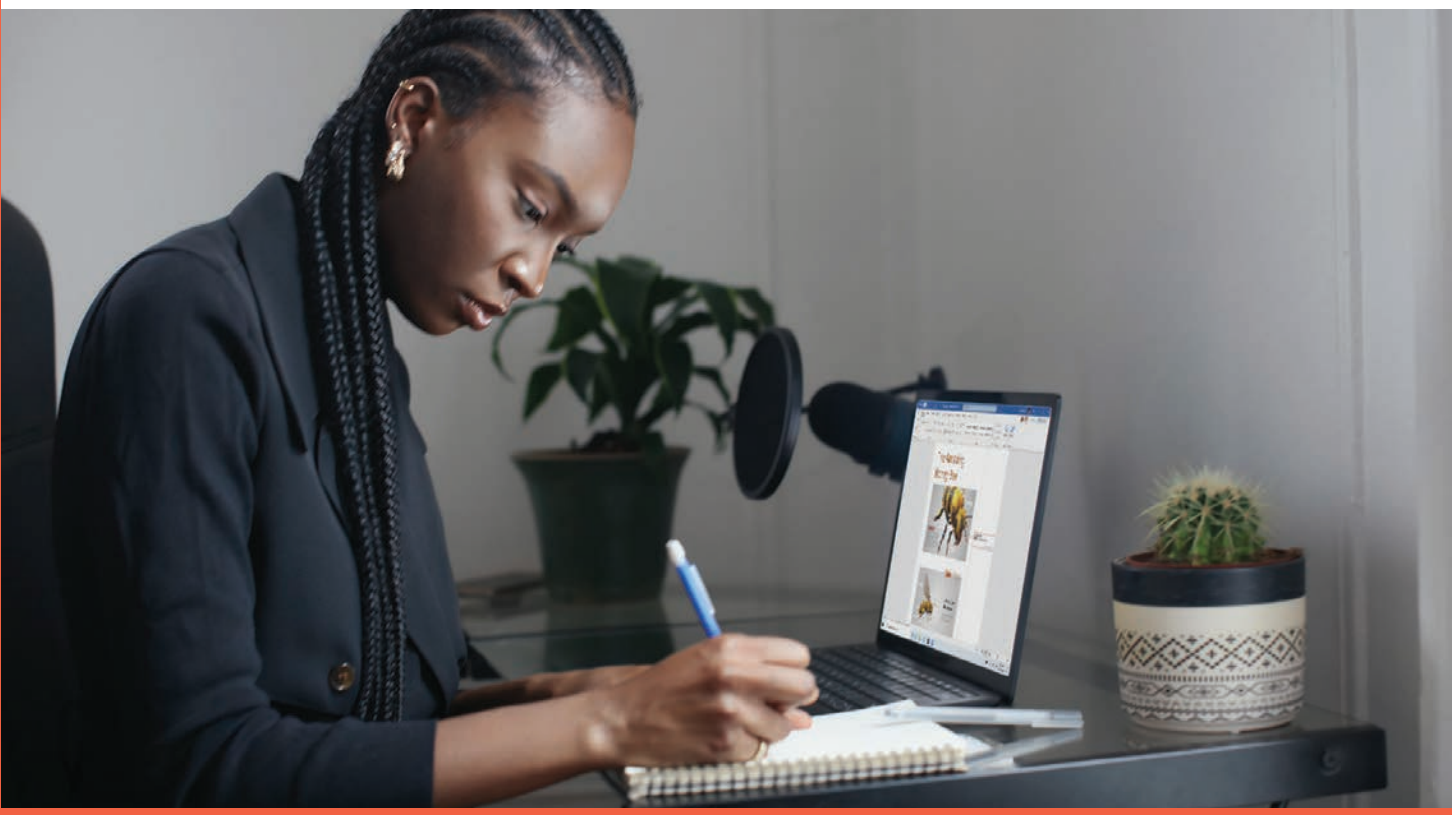
REDUCE TRANSPORTATION-RELATED FUEL CONSUMPTION

Metric:

- Number of electric vehicles in community and in the County government fleet
- Public transportation mode share

REDUCE VEHICLE AND MOBILE EQUIPMENT USAGE

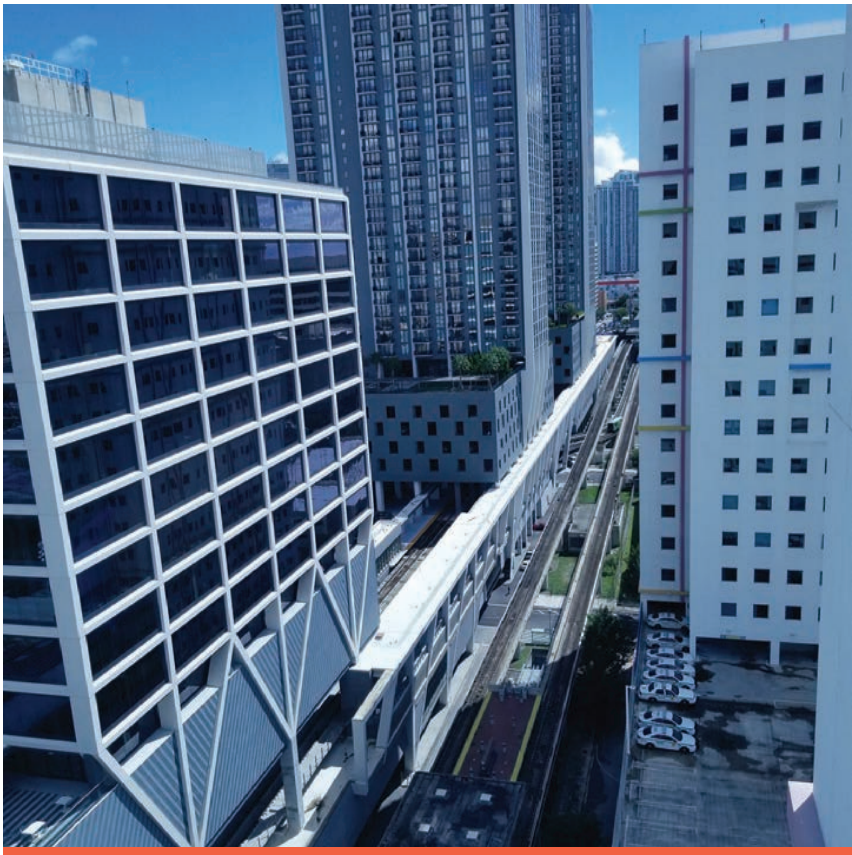
Land use development patterns and zoning impact the amount of time necessary to travel to obtain goods and services. When development is spread widely across a geographic area, people need to travel farther to get to work or run errands. As of 2018, among large metro areas, Greater Miami had the 12th-worst traffic congestion and the 13th-longest commute time in the United States.[24] Traffic, operational conditions, and business protocols can all lead to idling of vehicles, vessels, aircraft and other equipment, resulting in air pollution, wasted fuel, excess heat, excess engine wear, and time lost in traffic. Reduced idling can therefore have many benefits, such as preventing riders from negative health impacts of vehicle exhaust exposure, reducing emissions, saving money from reduced fuel purchases and increased productivity, and saving people time.



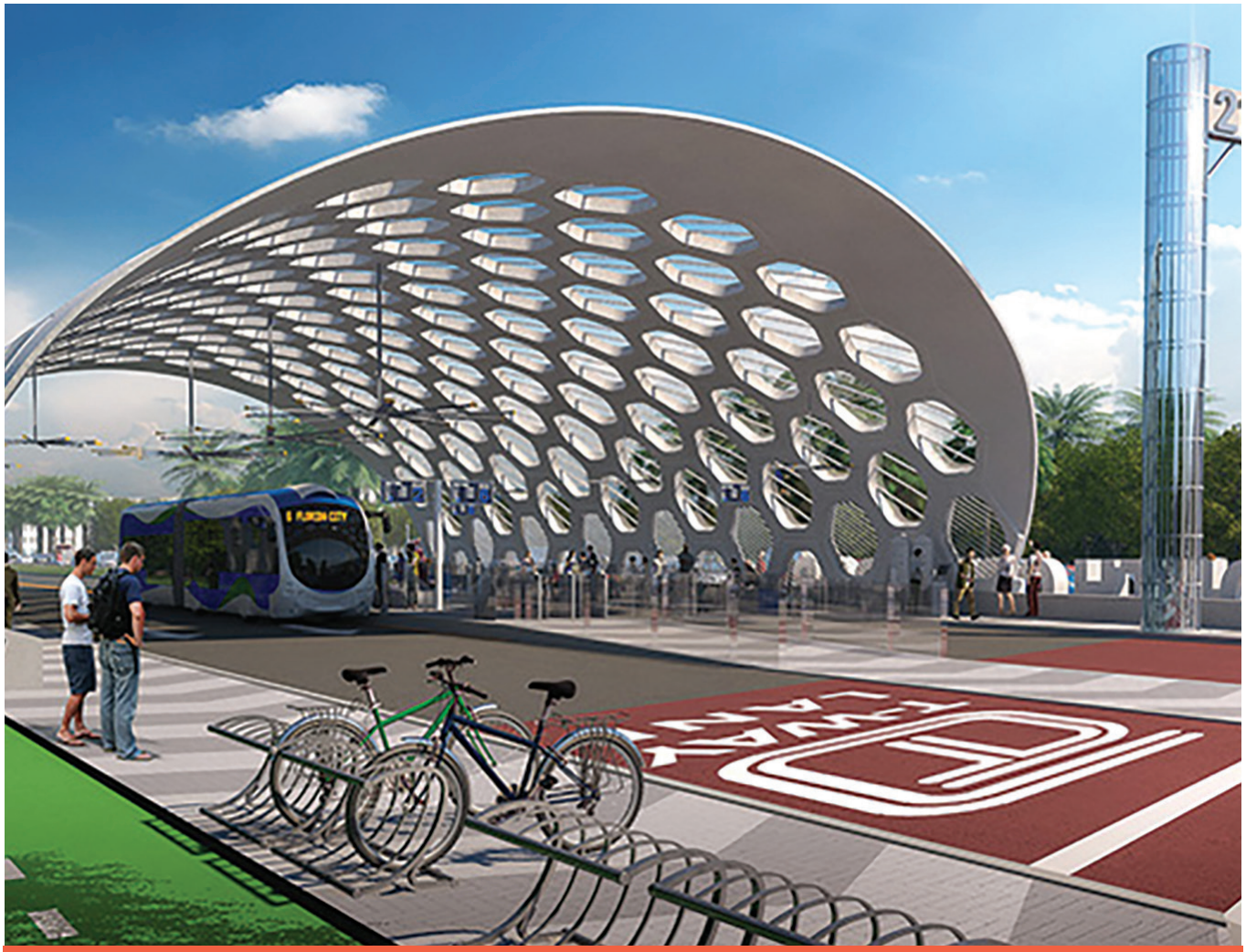
A January 2021 study by the Miami-Dade County Transportation Planning Organization found a 50% decline in daily traffic volume on some of Miami-Dade's major highways from late March to early April 2020 during the Covid19 Pandemic. One outcome of the study was a Pilot Telecommuting Policy in partnership with South Florida Commuter Services to provide outreach and education geared to maximize telecommuting opportunities in South Florida. Telecommuting not only reduces traffic congestion, but also dramatically reduces carbon emissions related to transportation.

Actions to reduce vehicle and mobile equipment usage:

- Design an Alternative Workplace Solutions policy and program for Miami-Dade County to maintain and expand the number of employees who telecommute and explore methods to encourage other large employers to implement telecommuting ***Community Recommendation*** ✓
- Double the utilization of roundabouts instead of traditional street intersections
- Facilitate infill, compact, and mixed-use re-development with increased density ***Community Recommendation*** ✓, especially along SMART Plan Corridors
- Build transit-oriented developments ***Community Recommendation*** ✓
- Make sure bus stops are positioned under trees or other means of shade to safeguard transit users from extreme heat ***Community Recommendation*** ✓
- Pilot a Mobility-as-a-Service (MaaS) program
- Implement a Countywide Mobility Rewards Program to incentivize the use of public transportation and integration among mobility providers ***Community Recommendation*** ✓
- Partner with Miami-Dade County Schools to analyze and propose adjustments to school schedules to minimize traffic when school is in session.
- Expand effective low-carbon mobility options.



Transit Oriented Development (TODs) can reduce emissions by 20% – 40% by reducing the need for residents to drive to access goods, services, schools, and jobs. In addition to Miami-Dade County's own TODs, the County's Board of County Commissioners approved the creation of a downtown rapid transit zoning district to encourage TOD investments from the private sector. In the downtown area, one resulting project has been the MiamiCentral station of the Brightline commuter rail with service beginning in 2018. Development of two residential towers has also been initiated in addition to retail space. Best of all, Brightline development is adjacent to the County's Metrorail and Metromover stations, with future connections to the existing Tri-Rail and planned Northeast SMART Corridor commuter rail lines.



In June of 2021, Miami-Dade County's Department of Transportation and Public Works (DTPW) broke ground for the all-new South Corridor Bus Rapid Transit (BRT) Project. Once completed, this BRT project will provide 20 miles of exclusive transit right-of-way, parallel to US-1, with signal preemption, offering an easy 60-minute ride on all-electric buses from Homestead to Downtown Miami.

Nearly half of Miami-Dade households have limited or no access to a private car. The Covid-19 crisis added new uncertainty to residents' transportation options, especially for public transportation. Expanding the mix of reliable, safe, and convenient low-carbon transportation options, including public transit, bicycling, walking, and micro-mobility (for example, electric scooters) can accelerate the shift away from driving and is critical to ensure the economic and social well-being of Miami-Dade residents. These options reduce the number of vehicles on crowded roads and cut air pollution, directly improving health in communities.

Actions to expand effective low-carbon mobility options:

- Implement the Miami-Dade 2045 Bicycle/Pedestrian Master Plan
- Develop and implement a pedestrian prioritization plan
- Implement Complete Streets and Vision Zero pedestrian and cyclist safety programs
- Rapidly deploy premium public transit solutions along SMART plan corridors to increase ridership and mode shift from single occupancy vehicles
- Allow the use of excess solar power at Countywide bus shelters to power micromobility/electric bicycle equipment. ***Community Recommendation*** ✓
- Explore the use of all County-owned property for deployment of DTPW first- and last-mile services, such as electric bicycle stations, protected bicycle parking, universal bicycle racks, on-demand and ridesharing pick-up/drop-off.

ACCELERATE ELECTRIFICATION OF VEHICLES AND EQUIPMENT

Economic forces increasingly point to a future in which electric vehicles (EVs) are the standard. Every year, prices for EVs drop, the variety of models expands, and the number of charging stations increases. Right now, electric cars are cheaper to fuel (charge) and maintain than traditional vehicles that use fossil fuels.[25] Policies and programs that accelerate EV adoption in Miami-Dade County will create new industries and prepare us for a true low-carbon future once vehicles are charged by renewable energy sources. Methodologies for fostering vehicle electrification differ based on the two main types of vehicle owners/users: the general public or large fleet owners, typically businesses and governments.

In September of 2021, Miami-Dade County officially opened its first downtown public access chargers through an innovative marketing partnership agreement with a local business. This brings the County's total to 59 electric vehicle charging ports, the majority of which can be used by the public.

Miami-Dade County will soon have one of the largest sustainable electric bus fleets in Florida and in the nation. The Board of County Commissioners has approved procurement of 75 battery-powered 40-foot electric buses, with chargers to be installed across three bus depots. Electric buses have zero tailpipe emissions, saving approximately 230,000 pounds of greenhouse gases annually per bus compared to a traditional diesel bus.

Actions to Electrify the County Fleet and Equipment:

- Complete a light fleet electrification analysis to guide replacement of County-owned fossil-fuel vehicles with battery-electric vehicles (BEVs)
- Modify procurement methodologies to account for lifecycle operational and maintenance cost savings of electric vehicles and equipment options
- Complete assessments of key County facilities to determine where to install EV charging infrastructure
- Find funding and modify facilities to install charging infrastructure, requiring charging infrastructure on County property to be EnergyStar certified and, wherever possible, that use renewable energy
- Complete assessments of County equipment to determine which equipment types should be prioritized for electrification
- Construct new or retrofit existing County bus shelters so they are powered by solar, unless there are impracticalities such as shading.
- Deploy electric buses to serve disadvantaged communities as the priority to help redress historic inequity issues.

Actions to Accelerate Community Vehicle and Equipment Electrification:

- Enforce and expand ordinances and other measures that require public charging and require Energy Star certified chargers on all County properties and any public projects for which the County provides funding, financing, or any financial support.
- Assist existing multi-family residential, office and commercial properties to retrofit for EV charging.
- Facilitate community education on the economic, social, and environmental benefits of vehicle and equipment electrification. ***Community Recommendation*** ✓
- Establish local regulations or other policy measures to ensure that all autonomous vehicles operating in Miami-Dade County are electric.
- Encourage the use of low or no emissions landscaping and gardening equipment.
- Use LED street lights as EV charging stations for on-street parking.

CUT EMISSIONS FROM OUR SEAPORT, AIRPORTS, AND OTHER COMMERCIAL TRANSPORTATION HUBS

In collaboration with the cruise industry and local utility Florida Power & Light, Miami-Dade County is working to have shore power at five cruise terminals by 2023, and will likely be the first port in Florida and the southeastern United States to provide shore power connections. Shore power will allow docked ships at PortMiami to turn off their engines, demonstrating an investment in sustainable transportation infrastructure that will reduce carbon emissions. The U.S. Environmental Protection Agency awarded a $2 million grant to the County in support of the project's first phase.

Miami-International Airport is expanding its automated docking system to additional terminals. This automated system provides real-time information to pilots for aircraft gate parking and push back upon departure, speeding up aircraft turn-around, which reduces delays for airlines and their passengers. The system can also help aircraft and support vehicles reduce engine run-times, reducing carbon emissions from the airfield.

PortMiami and Miami-Dade airports, anchored by Miami International Airport (MIA), have helped make South Florida an international gateway to the world, where successful movement of freight and passengers allows tourism and commerce to thrive. While these transit and commerce hubs create thousands of jobs, port trucks, trains, cargo-handling equipment, planes and ships use a lot of fuel. In fact, emissions from jet-fuel consumption at Miami International Airport represent nearly a quarter of all emissions in Miami-Dade County. Diesel engines are also common in cargo and cruise ships and emit significant amounts of air pollution, especially older engine models, which impacts human and ecosystem health and intensifies climate change and economic disruption.

U.S. ports and the large commercial corporations they serve have started to pursue aggressive strategies to reduce greenhouse gas emissions. Port of Miami's ambitious commitment to achieve an innovative net-zero supply chain is demonstrating leadership in the emerging low-carbon economy while serving as an incubator for best practices that will ensure continued economic health and competitiveness.

Actions to Reduce Emissions at PortMiami, Airports & Other Commercial Hubs:

- Implement PortMiami's visionary and transformational program to develop the nation's first end to end net zero carbon emission supply chain.
- Set cumulative goals to reduce emissions at PortMiami and MIA facilities, and develop plans with cruise lines and airlines to reduce emissions using best practices from the EPA National Port Strategy Assessment and Airports Council International's (ACI) Airport Carbon Accreditation program.
- Educate and work with airport and seaport facility user groups/tenants on industry-best practices for reducing fuel consumption.
- Install Visual Guidance Docking System (VGDS) at airports to reduce aircraft idling.
- Implement a shore power program for PortMiami cruise operations to reduce engine use.
- Support fuel reductions through other changes to fueling infrastructure, facilities, and operations such as: replacing older inefficient equipment and fleets, including vessels and aircraft; making operational improvements to reduce idling; switching to renewable, electric, or hydrogen fuels; improving routing and delivery efficiencies; prioritizing facility construction and modifications that increase water and energy efficiency and solar; and promoting related behavioral and educational efforts.

APPROACH 5:

EXPAND AND PROTECT GREEN AND BLUE SPACES

Land use programs and policies in Miami-Dade County that maintain healthy natural resources help address the negative impacts of climate change. Miami-Dade's land and marine ecosystems absorb and store carbon dioxide and other types of pollution[26]. Coastal habitats absorb carbon at a rate 10 times greater than mature terrestrial tropical forests. They also store three to five times more carbon per equivalent area than tropical forests.[27] While agriculture does not maintain ecosystems in their natural state, regenerative agricultural practices can be utilized to enhance carbon storage in the soil, and expanding the tree canopy increases shade and cooling, which reduces urban heat.

TARGETS

- Expand community-wide tree canopy to 30% coverage by 2030. ***Community Recommendation*** ✓
- Ensure that all County facilities within the UDB (per 2013 delineation) shall attain an average of at least 30% canopy coverage and all County facilities outside the Urban Development Boundary (UDB) shall attain an average of at least 50% canopy coverage by 2030
- Reduce pollutant loads to surface waters, including Biscayne Bay, to facilitate recovery of seagrasses to historic levels. ***Community Recommendation*** ✓
- Double the total non-wetland acreage of natural habitat in preservation

CO-BENEFITS

- Create jobs
- Support recreation and tourism
- Reduce storm damage
- Reduce flooding
- Enhance water quality
- Enhance air quality
- Reduce extreme heat
- Improve health outcomes
- Supply food
- Increase biodiversity

BOLD ACTIONS

- Develop methodologies to assess, track, and regularly report on changes to the amount of acreage and functional quality per ecosystem type in Miami-Dade County, in order to determine successful habitat protection strategies and to more accurately calculate carbon sequestration and storage
- Develop a mitigation policy, based on area impacted, to ensure that County-approved development results in a net increase to green infrastructure by the development's completion date
- Prioritize/require Florida Friendly Landscaping as the default County landscaping technique, including on County-owned or managed golf courses, to save water and reduce fertilizer/ nutrient runoff. ***Community Recommendation*** ✓

KEY FACTS

- Coastal habitats store more carbon per unit area than terrestrial forests.[28]
- A single healthy, mature tree can absorb carbon dioxide at a rate of 48 pounds per year and release enough oxygen into the atmosphere to support four human beings. [29]
- In the past 200 years, Florida lost an estimated 9.3 million acres of wetlands through drainage and conversion to other uses, the most acreage lost in the continental United States. [30]

APPROACH 5:

EXPAND AND PROTECT GREEN AND BLUE SPACES

Metric:

- Percent of tree canopy cover
- Load of pollutants in surface waters (canals and Biscayne Bay)
- Acres of natural habitat preserved (wetland and non-wetland)

Marine and coastal habitats (blue) and terrestrial natural areas (green) help remove carbon dioxide gas pollution from our atmosphere, which helps to slow down and eventually reverse climate change and related impacts. There are two main ways that natural areas can reduce carbon dioxide levels over the long term.[31]

- Carbon sequestration - absorbing or capturing carbon dioxide from the atmosphere
- Carbon storage - the long-term confinement of carbon in plant materials or sediment, with areas or habitats that do this sometimes referred to as carbon sinks

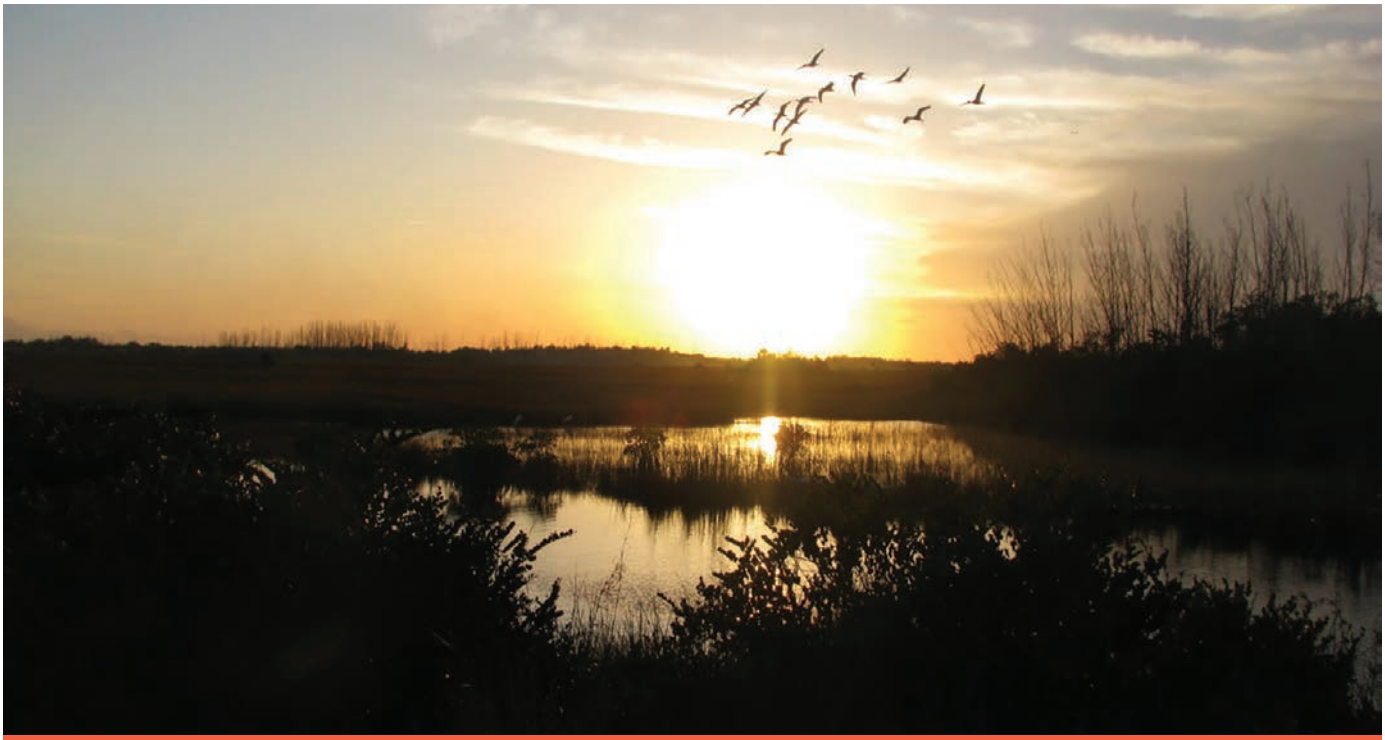
Mangroves, wetlands, and seagrass are essential to reducing atmospheric CO_2 concentrations and associated negative climate change impacts, such as rising temperatures and sea levels. Eighty-three percent of the global carbon cycle is circulated through the ocean, and coastal habitats account for half of the total carbon sequestered in ocean sediments despite their small area.[32] Meanwhile, on land, a 2011 study found that urban forests, trees, and parks in Miami-Dade County sequester more than 550,000 metric tons of carbon (more than 2 million tons CO_2e) every year.[33] Shade from urban tree cover also reduces cooling costs, saving residents and businesses money on air conditioning, while lowering the need for additional energy production.

A mixture of red and black mangrove trees along Biscayne Bay

According to the 2021 Urban Tree Canopy Assessment, 20% of Miami-Dade County is covered by trees. Despite major investments in tree planting, the amount of canopy coverage has not changed since 2016 due to canopy loss from both development and the impact of storms, such as Hurricane Irma. To reach the goal of 30% tree canopy, the County and community will have to protect the trees that provide shade, carbon storage, stormwater management and health benefits as well invest in planting new trees. The Urban Tree Canopy Assessment can be used to prioritize areas with less trees that are hotter and have higher utility burdens.

Maintaining natural areas results in multiple co-benefits that lead to greater community health by increasing opportunities for exercise and recreation, which reduce stress and the risk of heart disease, according to numerous studies.[34] These natural resources also help keep our soil, air, and water cleaner, which also provide significant health and economic benefits. In addition, natural resources increase property values and economic vitality in the tourism, fisheries, farming, and recreational sectors.

Current Miami-Dade County programs, led by multiple departments, help maintain ecosystems that protect against climate change by absorbing and storing carbon. In addition to coordinating and implementing Comprehensive Everglades Restoration projects, the County also manages programs such as Environmentally Endangered Lands (EEL), Natural Forest Communities protection, ecosystem restoration and enhancement, Million Trees Miami, and Adopt-a-Tree. Since estimating ecosystem acreage and functionality loss or gain and associated carbon absorption and storage benefits is complex, many of the actions below aim to improve current processes and associated data.



To date, Miami-Dade County's largest Environmental Endangered Lands Program (EEL) acquisition project is the South Dade Wetlands EEL Preserve. It consists of more than 22,000 acres and completion of a salt intrusion barrier longer than 900 feet along Card Sound Road, converting the area into wetlands. This Preserve acts as a keystone, connecting 3.5 million acres of contiguous wetlands within the greater Everglades system to Biscayne Bay. Home to endangered species and used by numerous migratory species during the Winter Bird Migration, this Preserve also serves County residents by providing flood protection, filtering surface water, and protecting fresh drinking water from salt water intrusion.

Photo caption: ***South Dade Wetlands EEL Preserve at sunset***

One successful Miami-Dade County Department of Regulatory and Economic Resources canopy restoration project involved planting 3,000 trees on four acres of an impacted fruit grove called the Powers Property. When mature, the newly transformed upland forest, an endangered ecosystem type, is projected to store 506,120 pounds of carbon and annually absorb nearly 260,000 gallons of stormwater, benefiting nearby communities.
Photo caption: From left to right; pre- and post- installation and two years after planting.

Additional actions that would expand and protect blue and green spaces in the future include work to:

- Assess current percentage of urban tree canopy coverage and work with Million Trees Miami stakeholders to develop new policies, procedures, and timelines to achieve canopy coverage goals.
- Ensure that all County facilities within the Urban Development Boundary (UDB) (per 2013 delineation) shall attain an average of at least 30% canopy coverage and all County facilities outside the UDB shall attain an average of at least 50% canopy coverage by 2030.
- Prioritize County planting of trees in neighborhoods with the highest heat or highest utility burden. ***Community Recommendation*** ✓
- Identify which County facilities have 20% or greater open space and determine which open space/bare ground areas at these facilities are not critical to facility function and can be used to plant trees.
- Implement the Open Space Master Plan.

To decrease dangerously high playground surface temperatures in Miami-Dade County parks, the Growing Green Playgrounds program plants shade trees for the safety and well-being of children and all residents and visitors, thanks to the work of Neat Streets Miami through it's Million Trees Miami Campaign. Since the launch of this initiative in 2018, 832 trees have been planted to shade 20 playgrounds. Most of these efforts have been made possible through the generous support of a public-private partnership with TD Bank.

- Restore Submerged Aquatic Vegetation (SAV) coverage in Biscayne Bay to historic baseline ***Community Recommendation*** ✓ by:
    - Determining the historic extent of SAV coverage.
    - Identifying the sources of pollutant loading and quantifying pollutant loads that affect SAV ecology.
    - Developing Best Management Practices (BMP's) to reduce pollutant loads to levels that promote SAV recovery.
    - Establishing science-based, pollutant load reduction goals and interim targets to improve water quality and codify these limits in Chapter 24.
    - Identifying targets for seagrass recovery.
    - Restoring SAV habitats whenever possible. ***Community Recommendation*** ✓
    - Protecting SAV from dredging-related silt. ***Community Recommendation*** ✓
- Update regulations to better protect specimen trees.
- Restore historically-filled, County-owned coastal wetland areas whenever possible.

- Prioritize acquisition, by Miami-Dade County and its partners, of wetlands necessary for implementation of the Comprehensive Everglades Restoration Plan, and within an Environmentally Endangered Lands acquisition footprint.
- Improve implementation and enforcement of County environmental regulations to eliminate net loss of wetland area and function within Miami-Dade County. ***Community Recommendation*** ✓
- Continue to invest in the preservation and restoration of fresh and saltwater wetlands and partner with Everglades restoration projects. ***Community Recommendation*** ✓
- Enhance living shorelines in Biscayne Bay in accordance with existing rules and policies that protect outstanding Florida waters.
- Improve County procedures to ensure appropriate vegetative material that is removed from County-owned lands, natural areas including conservation easements, and Environmentally Endangered Lands (EEL) is used as mulch and made available to the public free of charge.
- Improve protection and management of Miami-Dade County properties that qualify as environmentally endangered, or as natural forest community, by transferring appropriate areas/land to the Environmentally Endangered Lands Program (EEL).
- Require landscape re-certification every five years for maintenance of landscaping within 300 feet of a canal feature that flows into Biscayne Bay.
- Conduct feasibility studies for carbon sequestration that are consistent with existing resource protection requirements for shellfish, sponge, and macro-algaculture industries.
- Develop and adopt a strategy to expand local forests in Miami-Dade County through inter-agency partnerships.
- Explore using a portion of fishing license fees or license tag fees to generate funding for green and blue natural resources restoration projects. ***Community Recommendation*** ✓

Turtle and manatee seagrasses growing in Biscayne Bay

Central District Wastewater Treatment Plant on Virginia Key

WATER & WASTE

APPROACH 6:

CONVERT WASTE TO ENERGY

APPROACH 7:

REDUCE WASTE AND WATER USE

EMISSIONS FROM WATER & WASTE

4%

EMISSIONS REDUCED BY THESE APPROACHES
(PERCENT OF TOTAL CAS REDUCTIONS)

4%

WATER AND WASTE

Water and waste generate about 4% of GHG emissions in Miami-Dade County. Everyone in the community contributes to these emissions. The average person in Miami-Dade produces more than 1 ton of garbage per year and consumes 140 gallons of water per day. Emissions from waste have grown since 2014 as the amount of garbage burned in the County's Resources Recovery Facility has decreased and recycling rates have declined by 50%. The cheapest way to cut these emissions is by using less water and creating less waste. Good solid waste and wastewater management saves money. The typical American family throws away an estimated $1,500 worth of food every year.

Landfills and wastewater treatment produce methane, one of the most potent greenhouse gases. Methane is a valuable resource when captured and used to make electricity or as a substitute for gasoline or diesel. Capturing and converting waste to energy more efficiently could cut emissions 20% by 2030.

Reducing waste and water use at the source results in more water available for the environment and other needs and cleaner air due to lower emissions from landfills and from vehicles and facilities used to deliver and treat water and wastewater.

Fact: Miami-Dade County can produce up to 77 megawatts (MW) of electricity at its Resource Recovery Facility, which first opened in 1985.

Fact: Recycling a single aluminum can saves 99 grams of CO_2e. Recycling a 12-pack saves enough energy to drive a car 3 miles. People in Miami-Dade County only recycle 7% of the 16,000 tons of aluminum cans they use each year.[35]

Fact: Six cases of 100% post-consumer recycled office paper saves 1 ton of CO_2e, if created using renewable energy.

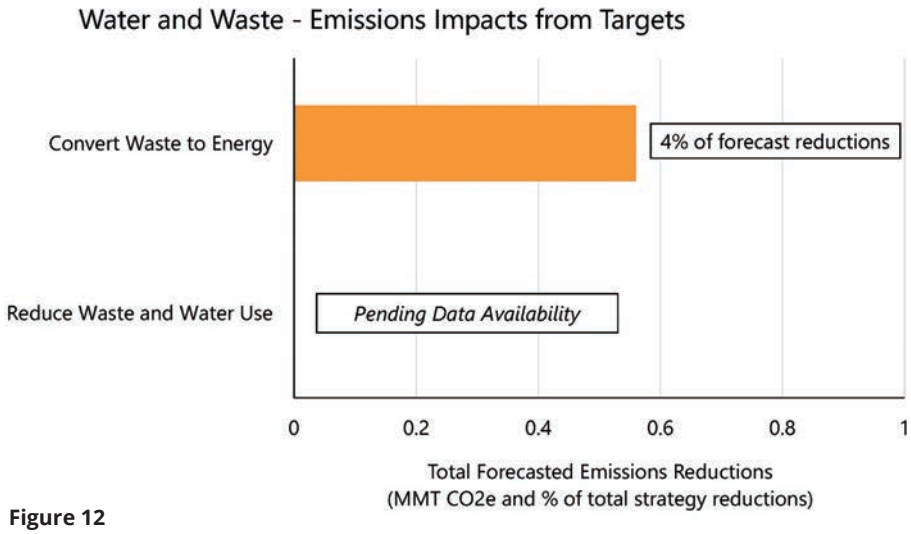


Figure 12

e-waste recycling at County neighborhood recycling center

APPROACH 6:

CONVERT WASTE TO ENERGY

Miami-Dade's Department of Solid Waste Management (DSWM) and its Water and Sewer Department (WASD) are the County's largest service providers for processing waste, water, and wastewater services in the county. These services are essential for community, environmental, and economic sustainability. For decades, both departments have burned waste to produce energy. By investing in new, more efficient facilities the County can create more energy, avoid harmful methane emissions, and avoid sending waste to the landfill.

TARGETS

- 48 GWh/year of electricity from cogeneration at wastewater plants by 2030
- 50% of non-recycled garbage converted to energy by 2030
- 10% increase in recycling rates and cut non-recyclables "contamination" in half

CO-BENEFITS

- Save money
- Enhance air quality
- Protect Biscayne Bay
- Reduce landfill waste

BOLD ACTIONS

- Build a new, more efficient electricity-from-waste facility with onsite solar, designed to charge electric vehicles in the County fleet
- Upgrade cogeneration at wastewater treatment plants to produce 9.6 megawatts of electricity from biogas
- Send food waste to the new Fats, Oils, and Grease (FOG) digester to create additional biogas
- Optimize routes for waste collection and water system maintenance
- Upgrade landfill gas collection at the South Dade Landfill
- Release a yard waste study and support composting

KEY FACTS

- Methane heats up the atmosphere 25 times more than the same amount of carbon dioxide
- The County's Resource Recovery Facility can produce up to 77 megawatts of electricity at maximum capacity
- Burning garbage reduces the volume sent to the landfill by 87%[36]

APPROACH 6:
CONVERT WASTE TO ENERGY

Metric:

- Energy produced from waste kWh/year
- Energy produced from wastewater, kWh/year
- Waste sent to landfills, tons/year
- Fuel used in WASD and DSWM fleet operations, gallons

Landfilled waste and wastewater produce methane, a greenhouse gas that heats the atmosphere 25 times more than carbon dioxide. Reducing methane emissions is critical to stop climate change, and one way to do that in Miami-Dade County is by converting waste and biogas into electricity.

Miami-Dade County's Department of Solid Waste Management (DSWM) Resources Recovery Facility (RRF) was built in 1982. It burns up to 4,000 tons per day (tpd) of municipal solid waste, producing up to 77 megawatts of electricity. Approximately 22,000 tons of ferrous (steel) metal and 2,000 tons of non-ferrous (tin, copper) metal are recovered and recycled every year. Through a collaboration with the University of Florida, DSWM has determined it is feasible to use bottom ash produced at RFF that is currently landfilled in cement production.

Miami-Dade County's Water and Sewer Department implemented a Plasma Energy Arc Process (PEAP) pilot that uses a new technology to reduce the volume of solid waste 95% while creating syngas (a mix of hydrogen, methane, and carbon monoxide) that can be burned for energy and steam used to process wastewater. The pilot has identified a substantially cheaper way to process biosolids that cuts disposal costs and emissions.

The Water and Sewer Department (WASD) and DSWM currently capture methane from wastewater treatment plants and landfills. Major upgrades to the systems at the Central and South wastewater treatment plants, and new wells at the North Dade and South Dade Landfills will improve collection of methane or biogas. This gas is burned to produce electricity that runs wastewater facilities. WASD plans to reduce its energy costs by increasing the amount of energy produced from captured methane from 3.2 MW to 9.6 MW at 7,500 hours/year by 2030.

WASD currently collects Fats, Oils, and Greases (FOGs) from restaurants and food producers across the County and creates biogas in a digester that is burned to generate power. WASD will explore including food waste in the FOGs digester, cutting landfill waste and creating more biogas.

WASD and DSWM both have large diesel and gasoline fleets with regular routes. The County will use new technology to optimize routes for waste collection and water system monitoring and maintenance, reducing fuel consumption and pollution in the community. Both departments will also work to convert their fleets to electric power. DSWM will start with tractor trailers and move on to electric garbage trucks. Using electricity from the Resources Recovery Facility, electric garbage vehicles could ultimately be fueled by the very garbage they collect.

APPROACH 7:

REDUCE WASTE AND WATER USE

Producing less waste and using less water are the easiest and cheapest ways to reduce emissions. In Miami-Dade County each person produces an average of six pounds of garbage and uses 140 gallons of water every day. Moving and processing that garbage and water takes a lot of electricity and fuel, which costs residents and businesses money. County water conservation, recycling, composting, and food recovery programs help reduce waste. Community-led initiatives and entrepreneurial innovation can have an even bigger impact by creating new businesses and jobs.

TARGETS

- Reduce landfill waste per person 50% by 2030
- Reduce water consumption per person 30% by 2030

CO-BENEFITS

- Save money
- Reduce infrastructure costs
- Enhance air quality
- Minimize landfill waste
- Protect Biscayne Bay
- Expand food access

BOLD ACTIONS

- Create a community-wide food rescue plan in collaboration with community-based organizations, businesses, and farmers
- Implement best practices to reduce and recycle construction and demolition waste, including requiring pre-construction waste management plans ***Community Recommendation*** ✓
- Complete a Countywide solid waste characterization study and complete regular updates
- Require waste reduction plans for all large events ***Community Recommendation*** ✓

KEY FACTS

- Over 1/3 of food grown and prepared for people is thrown away
- Residents, businesses, and hotels can receive rebates from the County for installing a high efficiency toilet ($50), showerhead ($25 or free), and faucet ($25 or free)
- Construction debris is 21% of solid waste in the County

APPROACH 7:
REDUCE WASTE AND WATER USE

Metric
- Water use per capita, gallons per day
- Landfill waste generated per capita, tons per year
- Percentage of paper, plastic, and metals recycled

The most effective and cost-effective way to reduce emissions from water and waste is to use and consume less.

With so many interconnected waterways and systems in Southeast Florida, Miami-Dade County fully supports the importance of a One Water approach for all aspects of water management. Efficient water use helps protect ecosystems, prepare for sea level rise, secure our long-term water supply, and save money.

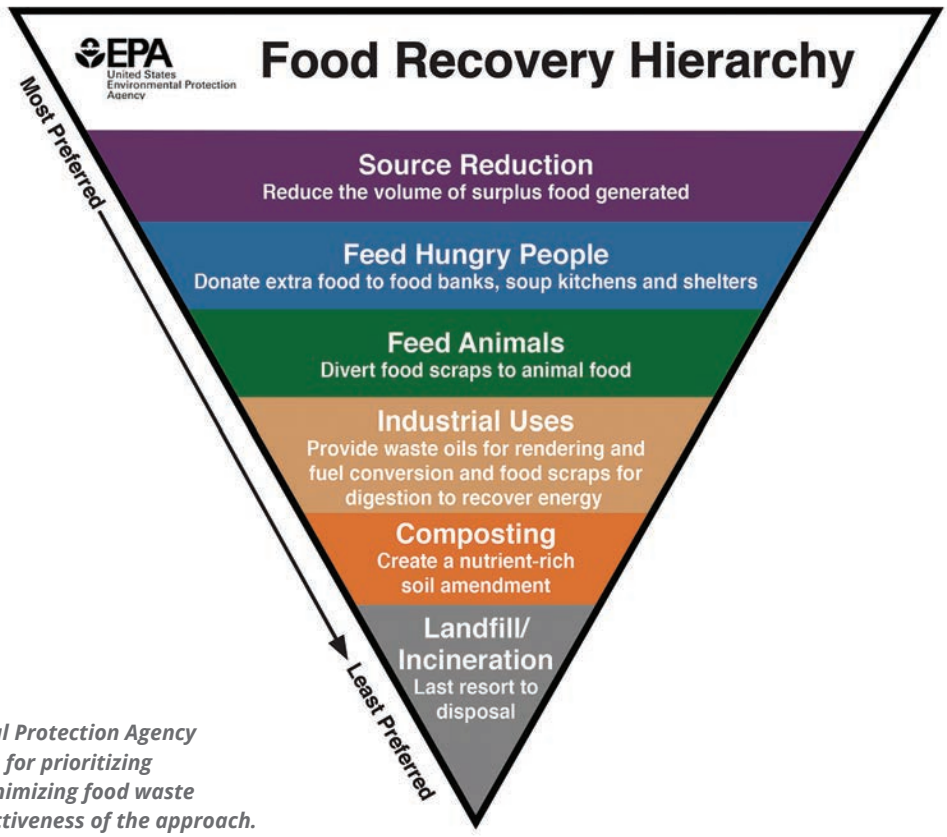
Waste in Miami-Dade County comes from many sources: 25% is paper, 21% is from construction, 12% is metal, 11% is plastic, 10% is food, and the remaining amount is a mixture of various materials. Different tactics are needed to reduce each. Better understanding the waste streams provides critical information on tactics that work best in reducing each source, since they vary widely. To analyze these needs, the Department of Solid Waste Management (DSWM) is completing a new communitywide solid waste characterization study that will be regularly updated. That data can be used to reduce the waste generated through partnerships with the private sector, education programs, and policies to minimize waste at the source.

The Village of El Portal partnered with Compost for Life to give residents the option to compost their food waste, keeping it out of landfills and putting carbon into the soil. The Village will receive a portion of the finished compost that can be used for gardening and landscaping. Landscaping reduce the need for fertilizers, pesticides, and herbicides, protecting the ecosystem and biodiversity of Biscayne Bay.

Construction and demolition (C&D) waste is the material left over when buildings and infrastructure are torn down or constructed. Miami-Dade's development driven economy creates a lot of C&D waste such as concrete, plaster, wood, and metal. Unfortunately, only 14% of this is recycled or reused. Best practices such as requiring a waste management plan before demolition of a building could help reduce landfill waste. It will also create new jobs in deconstruction and recycling.[37]

Food waste is one type of waste with great potential for reduction. More than one-third of food is never eaten. The U.S. Environmental Protection Agency food recovery hierarchy identifies ways to avoid food waste, starting with reducing purchases and utilizing excess supply to feed nearly 10% of people in Miami-Dade who are food insecure and don't have enough to eat. In communities like Denver, Baltimore, and Alameda County, local governments have partnered with community organizations to rescue food waste before it is thrown out. For more information see NRDC's Food Matters program. Food that cannot be eaten can be composted, reducing methane emissions, and nourishing soil.

Plastic Free Miami Beach is a program showcasing businesses that take action to reduce or eliminate single-use plastic. This reduces landfill waste and keeps plastic out of the ocean and Biscayne Bay. The City of Miami Beach has partnered with the Surfrider Foundation and Ocean Conservancy to expand the program, and it will serve as the framework for a Countywide initative. Learn more at **www.plasticfreemb.com**



U.S. Environmental Protection Agency recommendations for prioritizing approaches to minimizing food waste based on the effectiveness of the approach.

The Landscape Irrigation Rebate Program (LIRP) offers site assessments and rebates to single-family home and large commercial properties. In collaboration with Miami-Dade's Water and Sewer Department, the County's Florida Yards and Neighborhoods program led by the University of Florida/Institute of Food and Agricultural Services Extension evaluates the water use of in-ground irrigation systems to identify how they can become more efficient. Properties participating in the LIRP are eligible to receive rebates for water efficient retrofits made to their landscapes and irrigation systems. A recent large multi-family project achieved 14% water savings, equal to 11 million gallons per year and $39,000.

Miami-Dade County's Water and Sewer Department (WASD) is the largest water utility in the Southeastern United States, providing water and wastewater services to most residents in the County, either directly or as a wholesale supplier to 15 municipalities. The Water Use Efficiency Plan has reduced daily water use by 14 million gallons per day, saving energy and infrastructure costs and reducing customer bills. WASD's water conservation program provides rebates to residents and businesses for high efficiency toilets, faucets, and shower heads. It also provides landscaping tips and rain barrels.

GREEN ECONOMY

Cutting emissions is necessary. It is also good for the economy. Using less fossil fuel through efficiency and new technology like electric vehicles, solar, and green infrastructure saves money and will create new good paying jobs. We call this opportunity to create jobs supporting health and the environment the "Green Economy".

In Miami-Dade County, the green economy is poised for growth. That growth will be driven by small businesses, which contribute 80% of Miami-Dade's jobs. It will come from existing businesses and entrepreneurs in construction, engineering, manufacturing, software, agriculture, landscaping, and the service sector expanding to provide products and services as diverse as solar panels, energy audits, home renovation efficiency improvements, plants for bioswales, and alternatives to single-use-plastics.

Clean technology startups are attracting major investments to create innovations that companies, governments, and consumers can use to save energy and money. Large energy-intensive industries are also investing in the energy transition and green jobs. Cement manufacturers like CEMEX and Titan have made major commitments to cutting their global emissions, including hiring local firms to provide green solutions. Hospitals are another vital industry that is innovating to cut emissions through investments in energy efficiency, community solar, and telemedicine. Local universities and colleges provide the talent and innovation at the heart of the emerging green economy.

Miami-Dade County will work with partners across the community to accelerate the transition to a green economy powered by clean energy through a three-step approach:

1. Create Demand: Use multi-billion dollar local government, university, hospital, and large business procurement budgets to buy locally sourced green products and services, coordinated by the Anchor Alliance. Invest in energy efficiency, solar, and battery backup, starting with lower income communities that have older houses and pay more of their income to energy, i.e., have higher energy burdens. Expand green infrastructure countywide using locally grown trees and plants.

SOUTH FLORIDA ANCHOR ALLIANCE

South Florida Anchor Alliance is a collaborative of regional institutions - hospitals and healthcare systems, education enterprises, cities, and counties – that aims to harness over $3.7 billion in annual spending to create a more just and inclusive local economy. Dedicated to supporting small businesses, coordinated support for small green enterprises is one way the region will spur an equitable green economy.

MIAMI

The University of Miami in partnership with Miami-Dade College started an academically enhanced Heating, Ventilation and Air Conditioning (HVAC) apprenticeship program. It combines 144 hours of academic training and 2000 hours of on-the-job training with employer-partners. The first cohort includes 10 recent high school graduates and mid-career changers looking to get into the fast growing industry that is needed to help building owners meet the energy saving opportunities identified by Miami-Dade County's Building Efficiency 305 program.

Florida International University (FIU) and Florida Power and Light (FPL) are partnering on a cutting edge microgrid that combines a 1.4 megawatt (MW) solar array and 3.5 MW battery to provide 24 hours of emergency backup power for FIU's engineering center. Over 800 FIU graduates work for FPL, and this will provide hands on experience with the future of clean, resilient power.
"Our decade-long partnership with FPL demonstrates exactly how experimental projects like this microgrid can turn into world-changing developments practically overnight." - FIU President Mark B. Rosenberg

2. Build a Supply of Green Businesses and Workers: Develop a 21st century workforce through training and apprenticeships in collaboration with CareerSource, the Beacon Council, universities, and major employers. Expand existing small business mentorship and accelerator programs in collaboration with the Office of Equity and Inclusion. Work with Florida Power & Light, the growing tech sector, and the startup community to meet the demand for clean homes and transportation.

3. Finance the Transition: Create a regional "green lending" network in collaboration with CDFIs and private banks to leverage federal and state grants and loans to make it easy for low to moderate income (LMI) homeowners and businesses to finance energy efficiency upgrades including weatherization, solar, and electric vehicle infrastructure. These same tools can be used to finance other resilience projects like septic to sewer, green infrastructure, and floodproofing.

The City of Miami has released the report, "Miami Forever Carbon Neutral: Growing the New Green Economy". It identifies ways the City can accelerate job growth, encourage economic diversification, and advance workforce equity in its $1.1 billion emerging green economy through policy and investments in climate mitigation and adaptation. In addition to thousands of new jobs, it identifies 40,000 existing jobs that could be 'greened' in the transition to a more resilient economy.

INNOVATION AND EMERGING TECHNOLOGIES

Private industries and the federal government are investing in new technologies that could radically reduce our dependence on fossil fuels. Though these are not available at scale now, some are likely to become viable by 2030.

Green Hydrogen – Hydrogen produced by clean electricity from water is an emissions free fuel that can potentially be used in place of fossil fuel in trucks, ships, planes, and backup generators as well as power plants.

Low-Carbon Air Travel – Air travel is one of the most carbon intensive ways people get around. Airlines and startups are exploring alternatives to traditional jet propulsion including biofuels and synfuels as well as battery or fuel cell powered electric engines.

Super-Efficient Air Conditioning – Air conditioners are 30%-50% more efficient than they were 40 years ago. The Global Cooling Prize identified two new technologies that produce five times less emissions than current technology. Commercializing this technology with a focus on low-income communities would save emissions and reduce energy burdens.

Long-Duration Energy Storage – Affordable batteries that can store energy for more than 10 hours would make renewable solar and wind competitive with fossil fuel power plants. New technologies, like iron-air batteries, have been field tested and may be nearly ready for commercial deployment in the next few years.

Floating Wind Turbines – Traditional large scale wind power is one of the cheapest sources of energy but is not viable in Florida. Technological advances that allow turbines to float on the ocean rather than be anchored to the sea floor could open up a new industry and source of local clean energy along Florida's east coast.

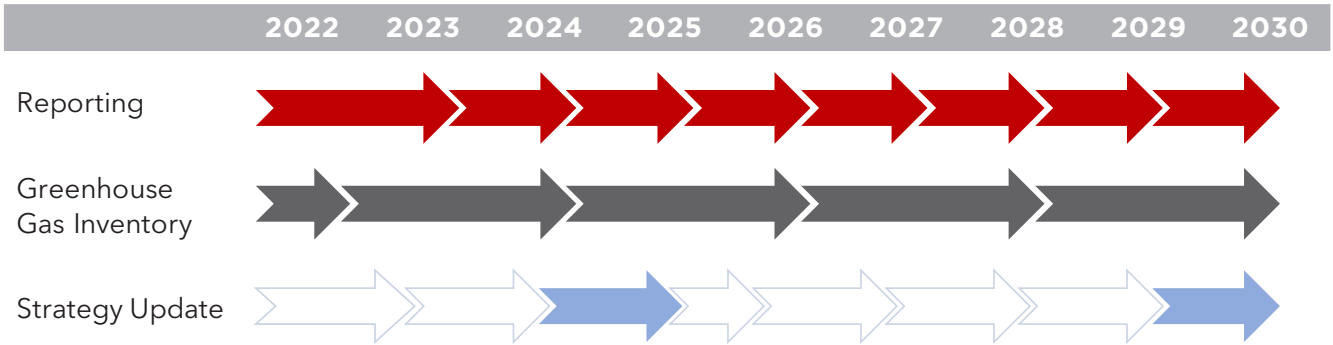
HyBrTec Biosolids-to-Hydrogen Pilot
Miami-Dade County's Water and Sewer Department is building a HyBrTec biosolids-hydrogen pilot plant, supported by a $1.15 million Florida Department of Environmental Protection grant. The plant will test a new technology that convert biosolids from wastewater treatment to green hydrogen, carbon dioxide, and heat. It will eliminate over 99% of biosolids and if successful will generate a sustainable local source of hydrogen fuel while saving energy and eliminating nutrient pollution in waterways.

IMPLEMENTATION

Achieving the targets identified in the Climate Action Strategy will take an implementation program that starts now and evolves to include new opportunities and technology. Actions in the strategy will be identified and tracked in the annual County Budget. Communitywide efforts will be pursued through ongoing collaboration with municipalities, Miami-Dade County Public Schools, and private sector partners using existing platforms including the Resilient305 PIVOT team, the Beacon Council, the Greater Miami Chamber of Commerce, the Office of Equity and Inclusion, and the County's long-term relationships with community based organizations.

In addition, the County Mayor has created the Resilience Action Team and Resilience Council to support the implementation of this Climate Action Strategy. A key component of this effort is to promote a shift in the County's organizational culture, operations, and capital investments across all departments with the goal of accelerating commitments to robust climate adaptation, carbon mitigation, and sustainability goals. Each department is represented and participating in these groups to provide reccomendations on how to best implement the approaches identified in this strategy, and ensure County projects and processes are aligned with our carbon emissions reduction goals.

Progress towards specific targets will be tracked through greenhouse gas inventories conducted every two years. Related metrics and a summary of investments the County has made will be provided through the budget process and on the County website. In five years, the Climate Action Strategy will be updated to incorporate new technology, funding opportunities, and community identified solutions. The County will measure short-term progress as we focus on reaching the long-term goal of zero emissions by 2050.



CONCLUSION

The Climate Action Strategy aims to drastically cut Miami-Dade County's greenhouse gas (GHG) emissions by 2030 to avoid intensifying climate change. Seven approaches that identify proven solutions to be implemented across the community, beginning today by accelerating actions already underway.

Meeting our ambitious goals will result in buildings that are more energy- and water-efficient, mobility choices that better meet our needs while ensuring cleaner air, new good paying jobs, and protected and healthy natural areas. Since this is a living document, the Climate Action Strategy will evolve as new technology becomes available, new policies are adopted, and new partners join in the collective effort to cut emissions and transition the County to a socially just green economy that benefits everyone in the many diverse communities throughout Miami-Dade County.

This Climate Action Strategy is a community wide strategy based on guidance and feedback collected through the unprecedented Thrive305 process, as well as surveys and meetings with residents, businesses and local stakeholders. That engagement continues past the publication of this Strategy. The Strategy is aligned with Thrive305 recommendations and will be implemented through the County budget process, with an expanded commitment to year-round engagement. In addition, the County will work closely with community partners to implement individual actions and ensure new voices are part of the evolving transformation into a low-carbon society.

Implementation of the Strategy will be ambitious, accountable, and collaborative. Regular reporting to the community in easily accessible and understand formats are critical to the success of this work. Identifying where we are succeeding and where gaps persist will attract partners with new solutions and help direct resources where they are needed most.

To reach our goal of 50% less emissions communitywide by 2030 and zero emissions by 2050, Miami-Dade County will have to work with energy producers and users to close the emissions gap. Building a carbon free economy that works for everyone will require ongoing participation from community organizations and leaders to help ensure local businesses and residents get the good paying jobs, cleaner air, cooler streets, and more affordable energy- and water-efficient buildings proposed in the Climate Action Strategy. Climate change is a shared existential threat and the transformative solutions in this Strategy are our collective roadmap for overcoming this challenge.

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