# Overcoming Barriers to Resilience: Individual & Multijurisdictional Approaches


## Chris Castro

*LEED GA, CPB*

*Director, Office of Sustainability & Resilience*

*City of Orlando*

# **Climate Adaptation Forum:** Climate Solutions from the Most Visited City in America…Orlando!

**Chris Castro, LEED GA, CPB**
Director, Office of Sustainability & Resilience
Future-Ready co-chair
City of Orlando

# Office of Sustainability & Resilience

## Green Works Orlando

- Award-winning sustainability program called “**Green Works Orlando**” launched by Mayor Buddy Dyer in 2007

- Develops internal and citywide policies + programs to:
  - Protect natural resources and the environment (air, water, land)
  - Improve public health and social equity
  - Create green economic dev. and green jobs opportunities
  - Decrease air pollution and carbon emissions
  - Enhance city resilience and adapt to climate change impacts
  - Reduce operational expenses and enhance efficiency
  - Educate the residents and businesses on sustainable practices

- Focuses on 7 key areas:
  - Clean Energy
  - Green Buildings
  - Local Food Systems
  - Zero Waste
  - Livability
  - Clean Water
  - Electric & Alternative Transportation

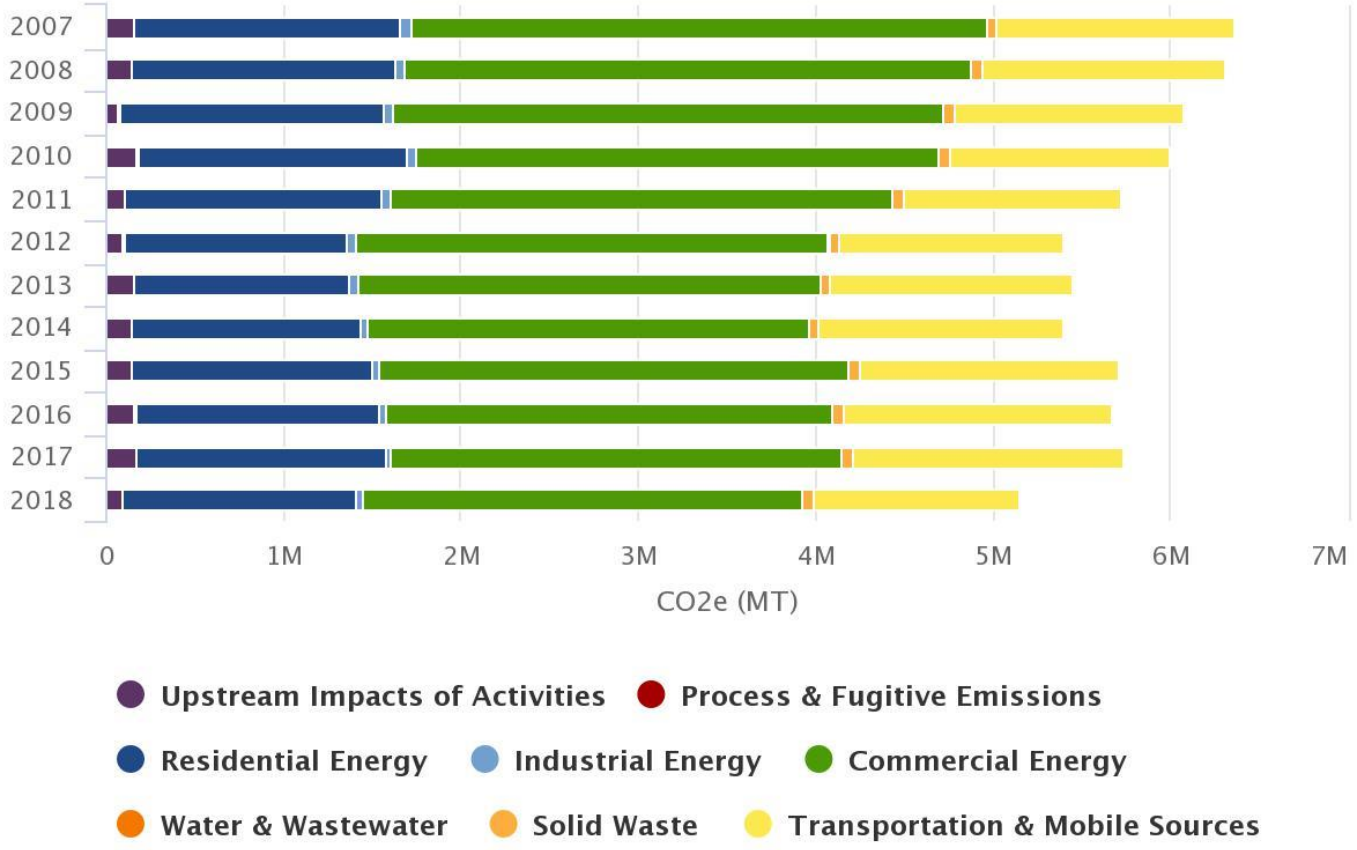
GREEN WORKS ORLANDO
cityoforlando.net/greenworks

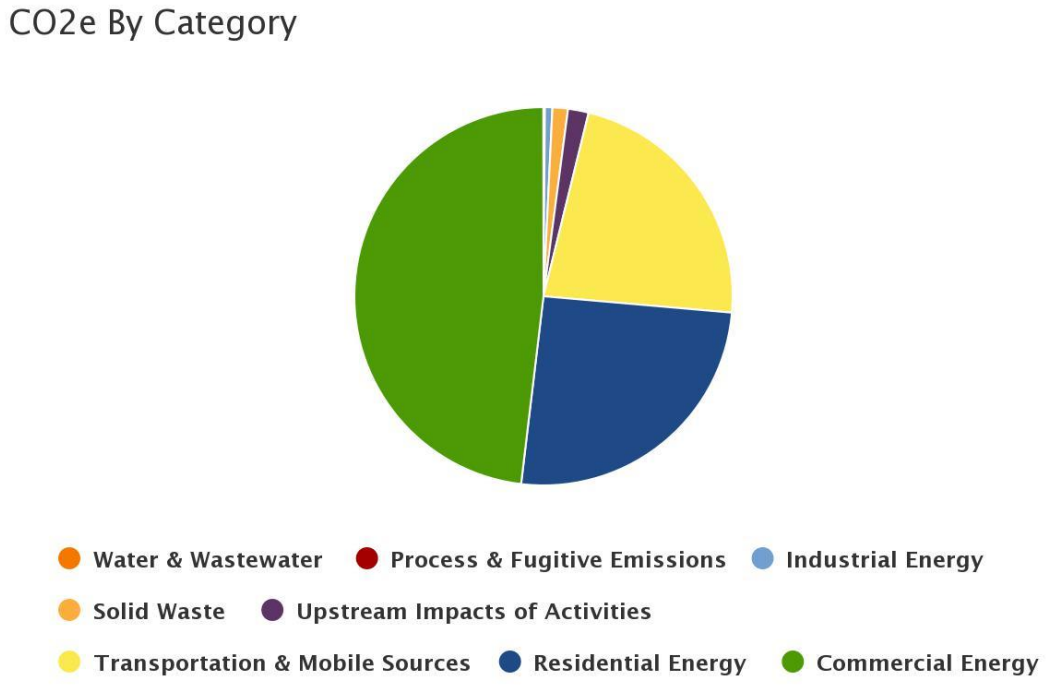
- Since 2007, we have implemented more than 100+ strategies throughout municipal operations & city-wide




SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

# Orlando's Citywide yearly emissions by sector / source



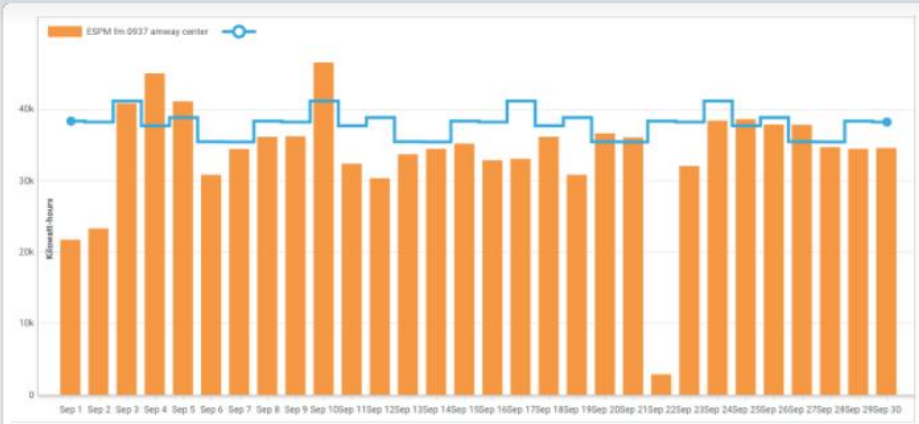



# Green Buildings

# Mandatory LEED Silver certification for City buildings – Grid Interactive Efficient Buildings (GEBs)




# Municipal Energy Efficiency Bond



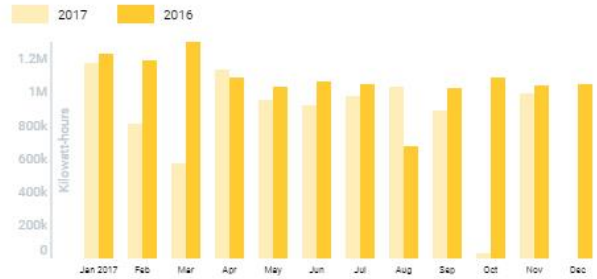

**10% Energy Savings Realized in the First Month**

Using historical electricity trends at the Amway Center, a weather normalized pre-LED lighting retrofit baseline was created. This graph shows the electricity use for the first month after the LED retrofit was completed compared to that baseline.


**Persisting Savings**

12+ months after the completion of the LED retrofit, the electricity savings are persisting. In that first year, 11% electricity savings - or 3,577,740 kWh have been realized. That is enough energy to power the average household for over 332 years!

**Year-over-Year Total Electricity Use** / 2017 compared to 2016

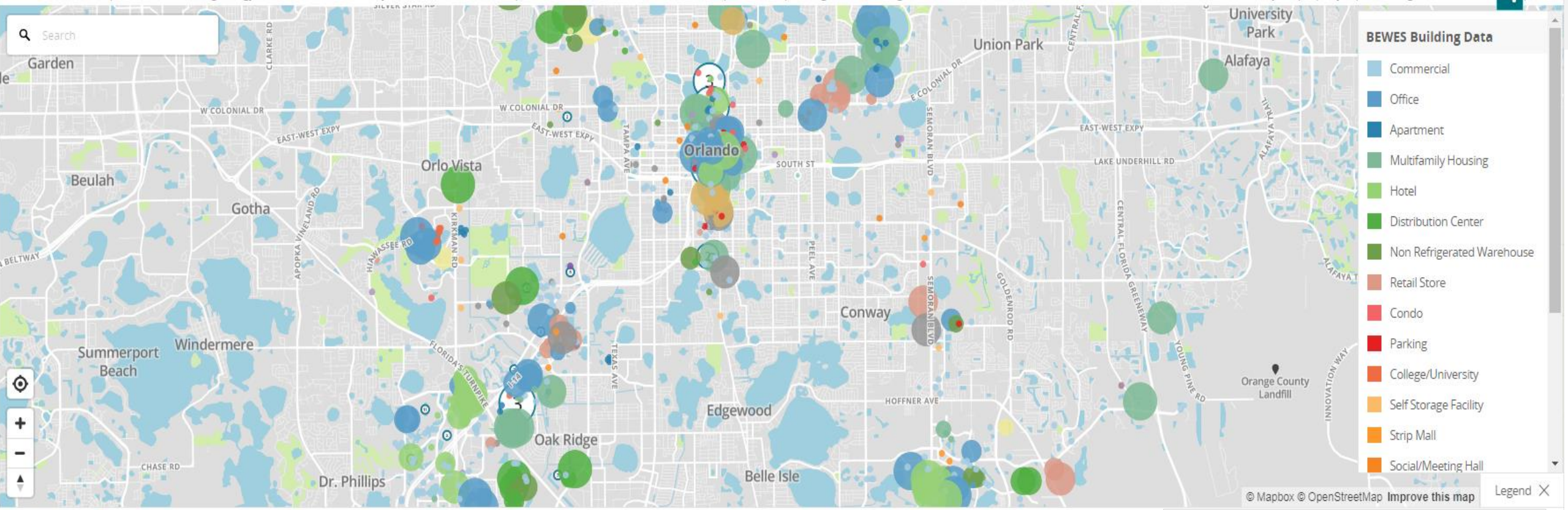


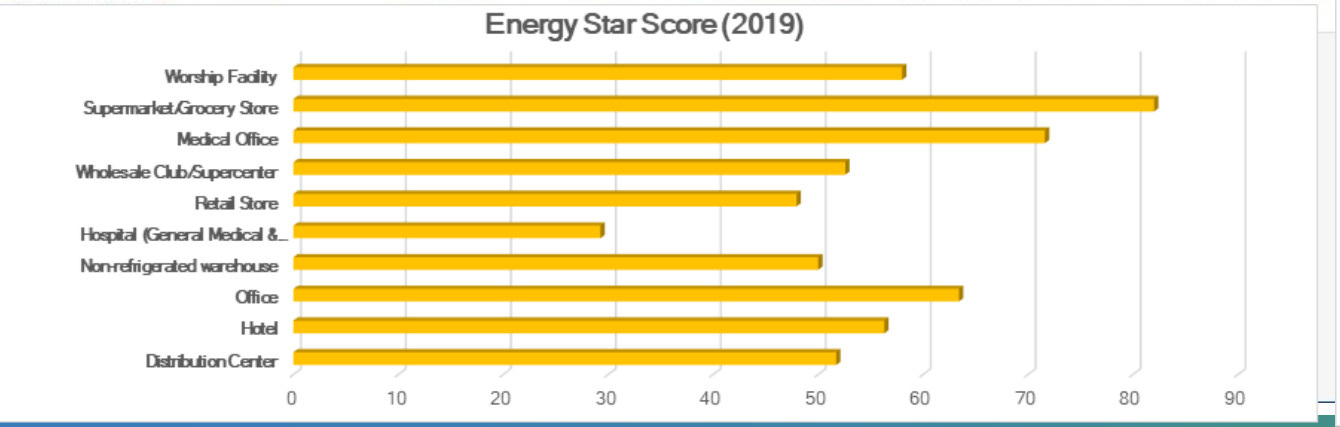

| Jan 1-Dec 31, 2017 | Jan 1-Dec 31, 2016 | Difference |
|---|---|---|
| 9.47M kWh | 12.79M kWh | ↓ 26 % |

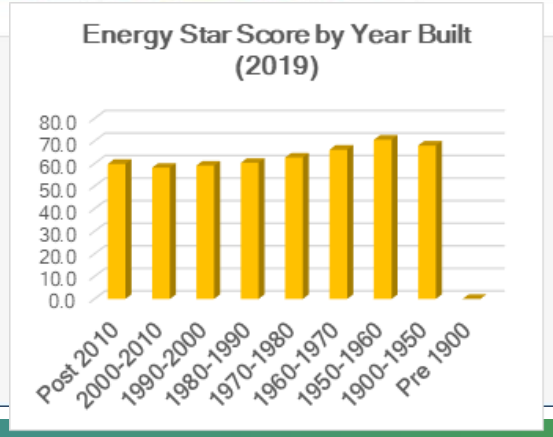
**Amway Center's Electricity Use Post LED Retrofit**
Last 12 months

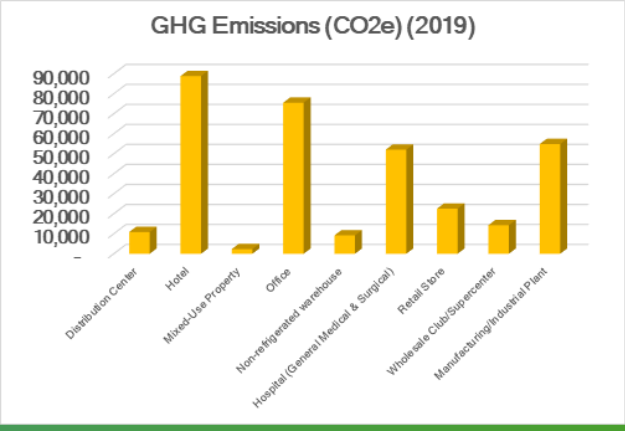
# BEWES Data by ENERGY STAR Score

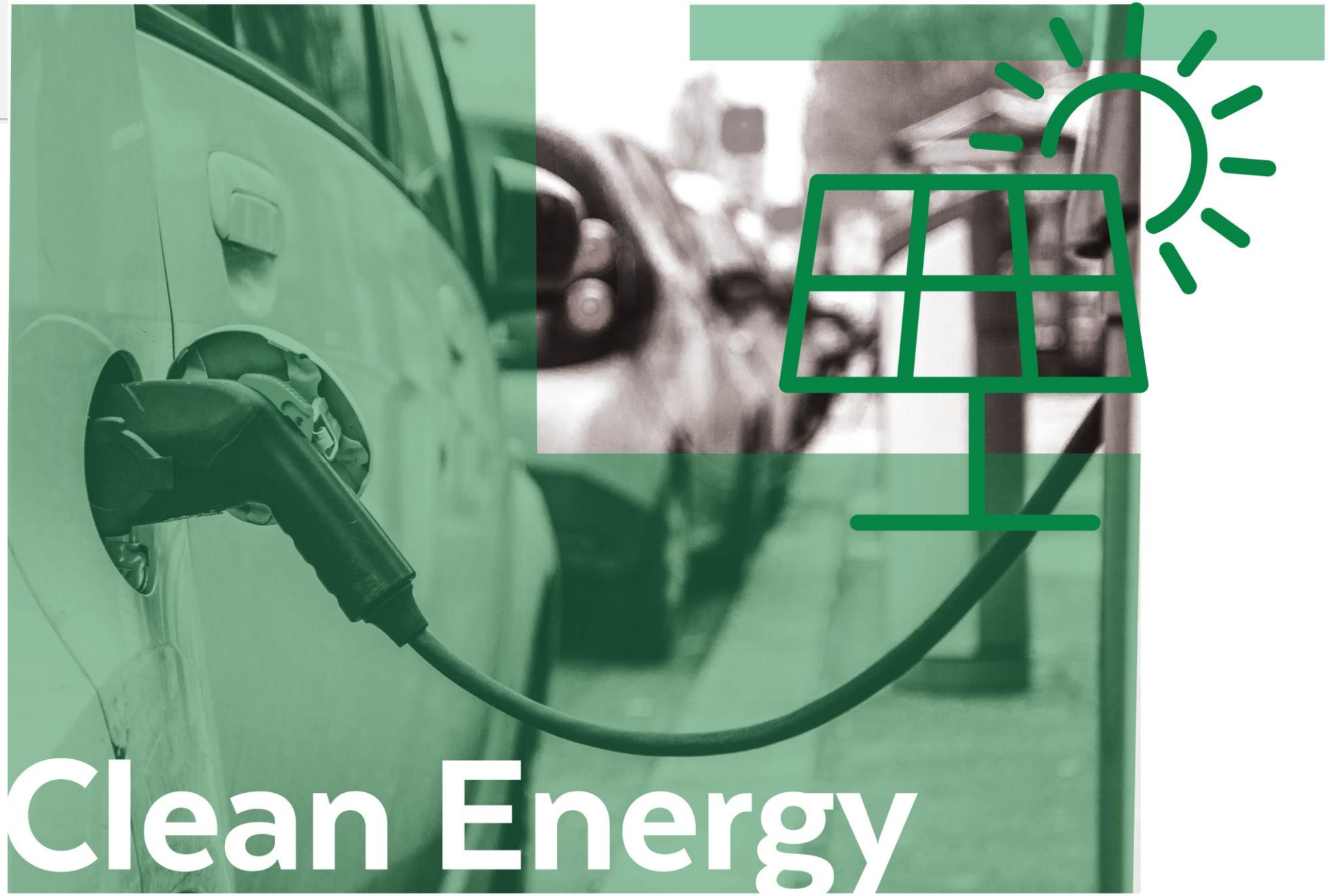
This visualization represents the building energy data submitted to the city for the 2019 BEWES compliance season with the size of each data point corresponding to the building's ENERGY STAR score. The ENERGY STAR Score is a measure of how well your property is performing relative to simila... pe...




Clean Energy

# OUC's Fuel Mix


- Coal = 775 MW
- Natural gas = 674 MW
- Nuclear = 60MW
- Solar = 30 MW
- Landfill Gas (RNG) = 35 MW
- Purchased = 277 MW


On August 8th, 2017, the City of Orlando adopted **100% Renewable Electricity Policy**:

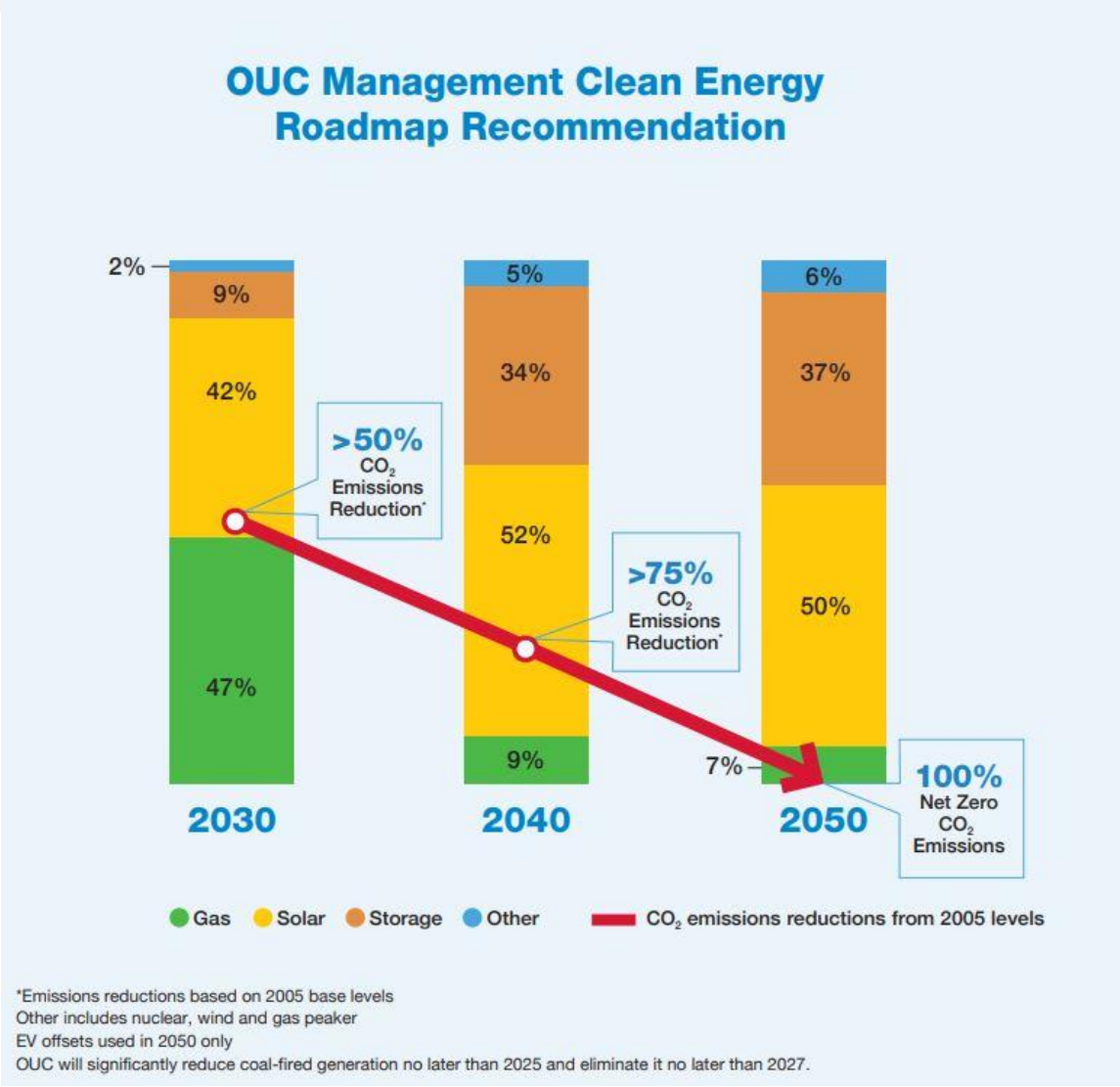
Municipal operations by 2030

Citywide by 2050*

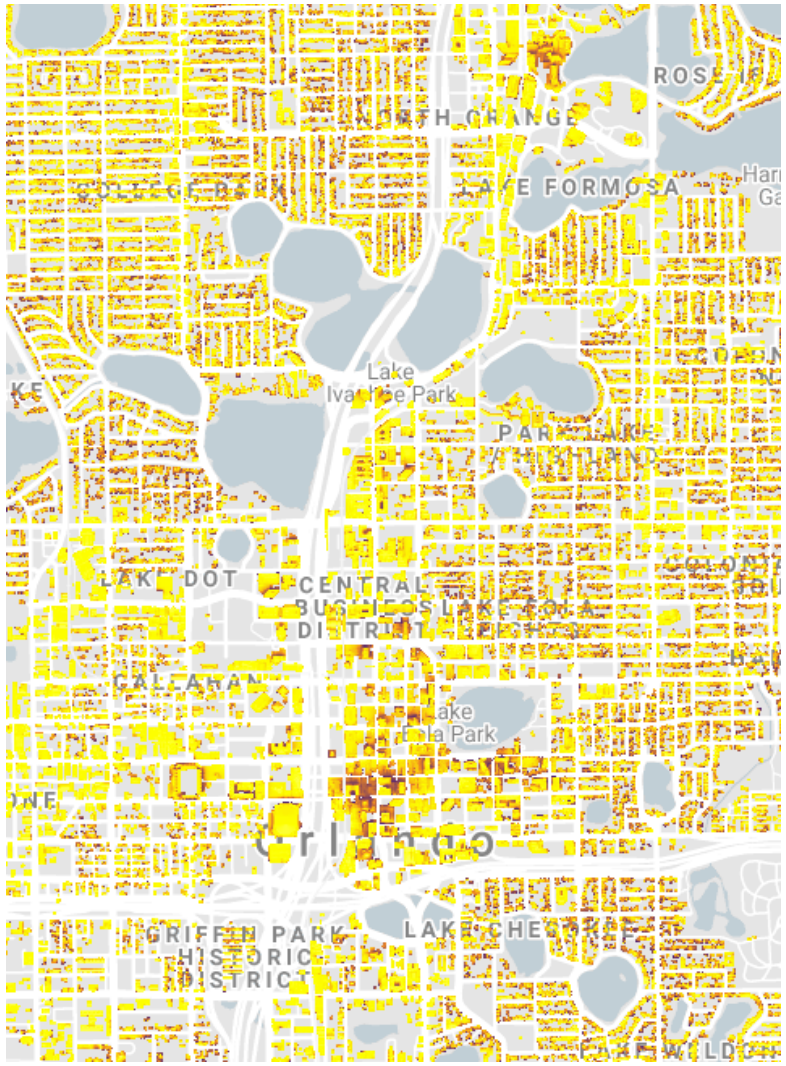
# Orlando Utility Pulling Plug on Coal-Fired Generation

OUC The Reliable One

- **Net-zero carbon by 2050**
- **End coal-fired generation**, with a significant reduction no later than 2025, and eliminating it no later than 2027.
- **Accelerate solar and energy storage as primary strategies**. The utility also said it "will continue to monitor cost and performance developments for new and existing clean technologies, such as hydrogen and small modular reactors."
- **Leverage future clean technologies** to ensure diversity for reliability, in order to reduce dependency on solar and storage.
- **Strive to maintain competitive rates for customers while achieving strategic goals**. The utility acknowledged that, "Advancements of this magnitude require significant investments. However, the recommendation delivers the best value."



# Citywide Rooftop Solar Potential Study – 2+ GW City-wide




Project Sunroof

greenlink

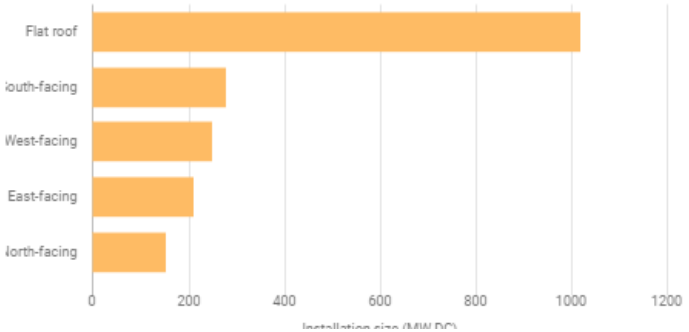
## Overall

Total estimated size and solar electricity production of viable roofs for Orlando, FL

| Roofs | Roofs |
|---|---|
| 92% | 54.5K |

| Roof space | Capacity | Electricity |
|---|---|---|
| 135M sq ft | 1.9K MW DC | 2.6M MWh AC per yr |

Total installation size (MW DC)

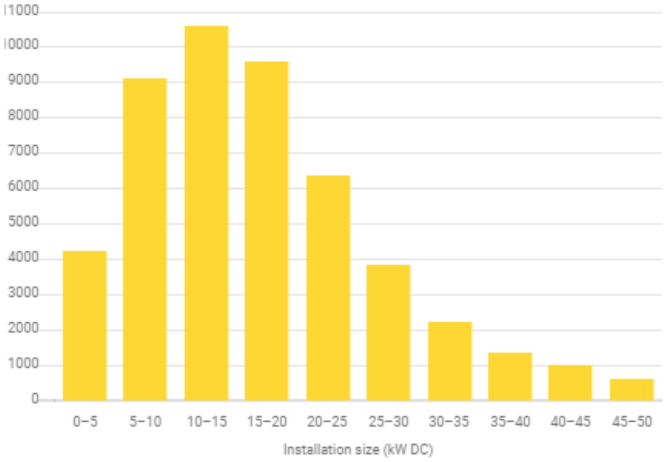



## Per roof

Median estimated system size and solar electricity production per viable roof for Orlando, FL

| Roof space | Capacity | Electricity |
|---|---|---|
| 1.2K sq ft | 16.3 kW DC | 21.6K kWh AC per yr |

Rooftop solar capacity distribution (number of roofs, < 50kW)



# FLEET & FACILITIES COMPLEX

SOLAR UNITED NEIGHBORS

2019 Coop = 62 residents, 748 kW

2020 Coop = 43 residents, 491 kW

Avg. Price: $1.87/watt - $2.15/watt

# ORLANDO SOLAR CO-OP

INFORMATION SESSIONS WITH SOLAR UNITED NEIGHBORS

## Orlando Co-op Successes

- 7 co-ops
- 146 went solar
- 1.5 MW installed
- $3,308,962 invested in local economy
- 1,100 educated
- 50.6 million lbs of CO2e offset

2020 Orlando Solar Co-op Open Now!

SOLAR UNITED NEIGHBORS

# 130 MW+ Community Solar program — 150MW in pipeline

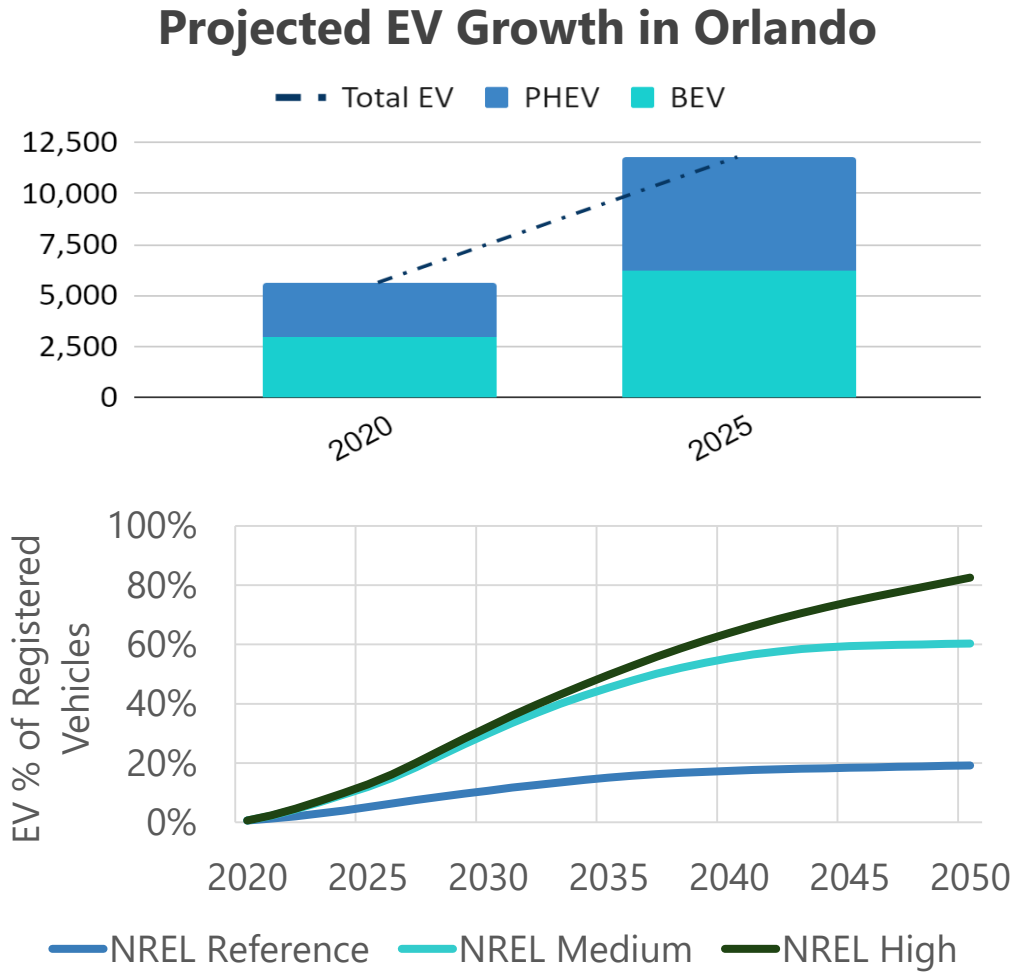

Tue Nov 17 2020
50 ft
nearmap

# Hydrogen Production and Utilization


# Transportation

# EV adoption and EV charging needs are growing rapidly.

- By 2025, EV adoption is projected to more than double in the Orlando metro area.
- By 2030, EV adoption is projected to reach 10-30% of registered vehicles, and by 2050, nearly 70%.
- Beneficial outcomes for environment, community health, local economic development




**Source:** NREL, ICCT

# Municipal EV Fleet - ~3,000 vehicles

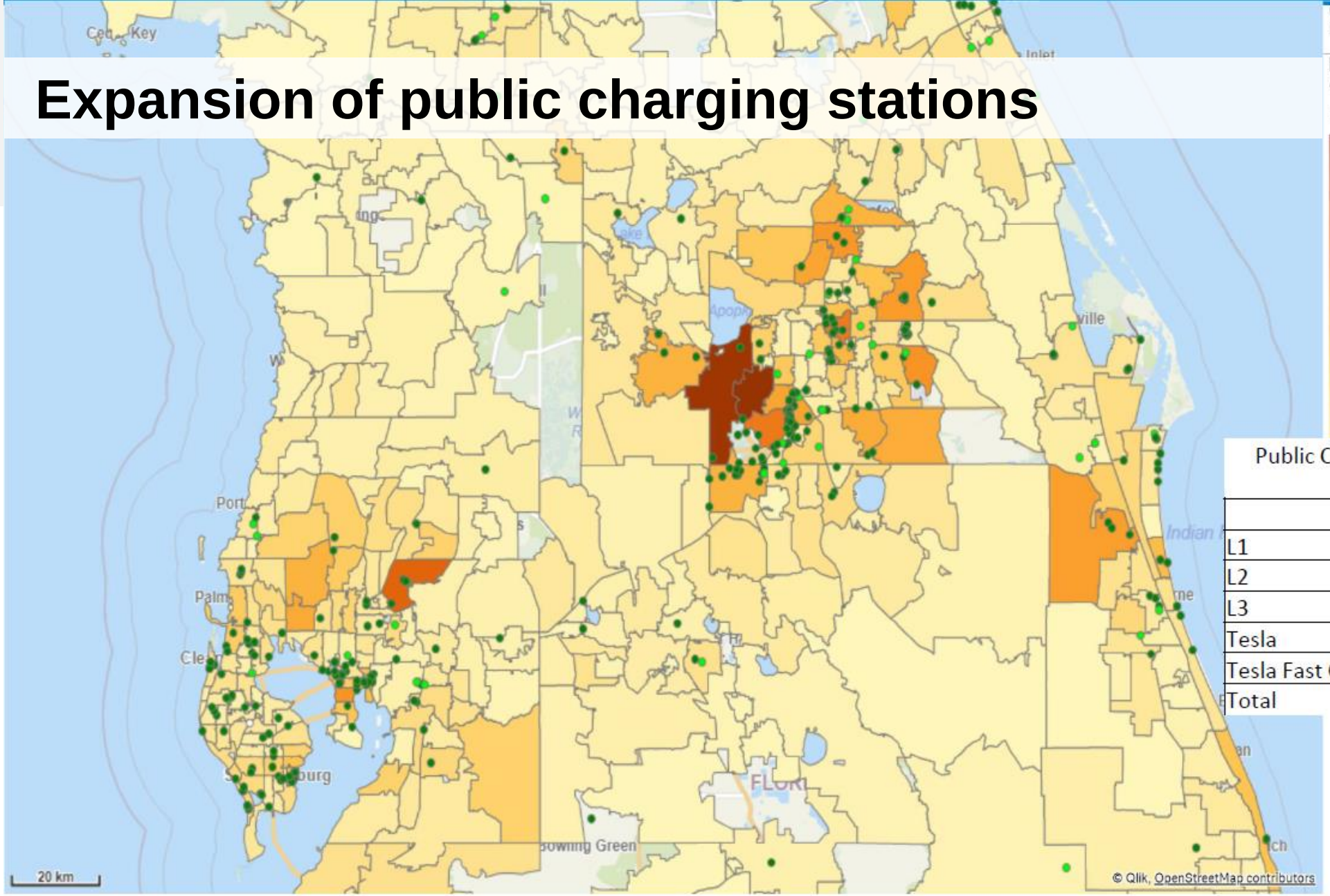
- **Goal:** 100% Electric and Alt. Fuel for all City Fleet by 2030

- **200+ EV & Hybrids in City Fleet**
  - 15 new Chevy Bolts EV's for City Hall motor pool
  - 15 Nissan Leafs
  - 4 EV Motorcycles for OPD
  - Solar golf cart pilots

- Submitted LOI for 100 F-150 EV Trucks

- **EV Purchasing Collaborative with Climate Mayors**


# Expansion of public charging stations




Public Charging Stations in OUC Territory

| | Stations | Ports |
|---|---|---|
| L1 | 11 | 12 |
| L2 | 109 | 263 |
| L3 | 9 | 18 |
| Tesla | 16 | 37 |
| Tesla Fast Charge | 3 | 28 |
| Total | 148 | 358 |

** Currently showing a limited data set.*

# Starting April 2021, the City of Orlando and OUC will be enabling 100+ new Level 2 EV charging stations throughout City parks, Rec centers, parking garages, and more.

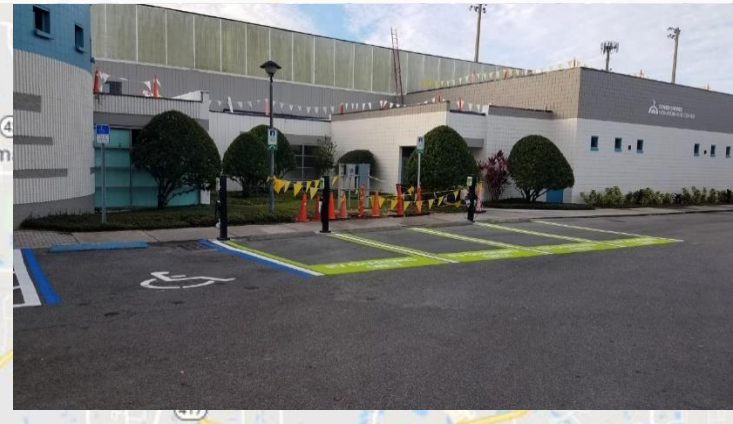
EV Charging Locations - City-Wid...

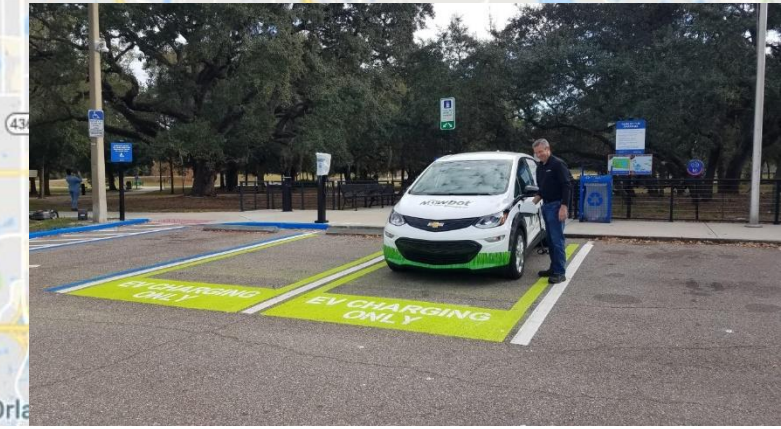
A map of the recommended locations to implement public facing EV chargers

94 views

All changes saved in Drive

Base map





# EV Recharge Mobility Hubs



# East Central Florida Regional Resilience Collaborative (ECFR2C) Structure

PROCESS PERSPECTIVE

East Central Florida Regional Planning Council

Council Sub-Committee

Steering Committee

- Focus Area TAC
- Focus Area TAC
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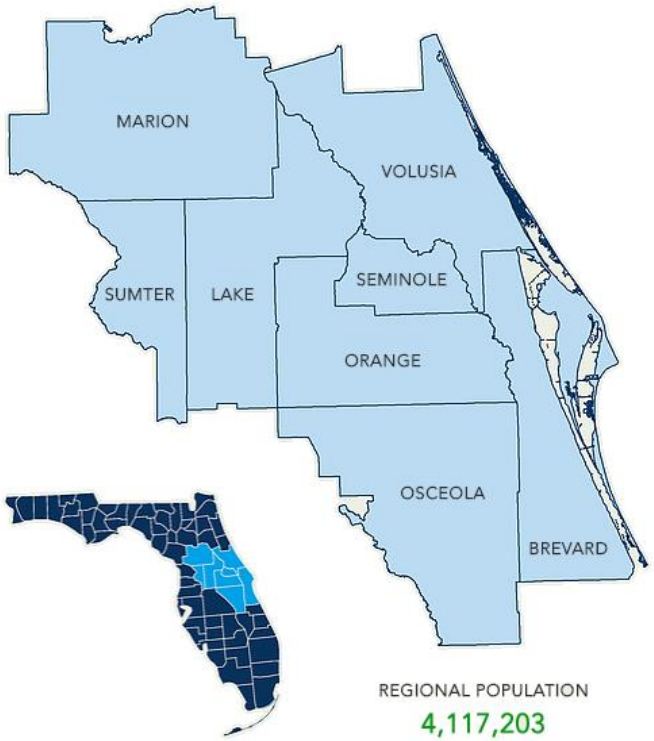


EAST CENTRAL FLORIDA REGIONAL RESILIENCE COLLABORATIVE

# Formalized Partners

EAST CENTRAL FLORIDA REGIONAL RESILIENCE COLLABORATIVE


SUN SPACE AND SEA
CITY OF CAPE CANAVERAL

CITY OF ORLANDO, FLORIDA
THE CITY BEAUTIFUL

CITY OF SATELLITE BEACH

DE LAND
1882
FLORIDA

KISSIMMEE
Founded 1883
IN GOD WE TRUST

Volusia County
FLORIDA

RIVER TO SEA TPO
Transportation Planning Organization
VISION - PLAN - IMPLEMENT

TITUSVILLE, FLORIDA
FOUNDED 1867

City of Mascotte
19 25
Florida

INDIAN HARBOUR BEACH
FLORIDA

I'm Proud To Be A Part Of It!
City of Deltona
Incorporated December 31, 1995

CITY OF OAK HILL
FLORIDA

SEAL OF BREVARD COUNTY
1513
1854
1969
FLORIDA

OSCEOLA COUNTY
FLORIDA

The City of Palm Bay Florida
A Perfect Place to Grow

ORANGE CITY
1882
FLORIDA

TOWN OF MELBOURNE BEACH
FLORIDA

NEW SMYRNA BEACH

CITY OF MOUNT DORA

ORANGE COUNTY
FLORIDA

SPACE COAST TPO

CITY OF ROCKLEDGE, FLORIDA
OLDEST CITY IN BREVARD

LAKE COUNTY, FL
REAL FLORIDA · REAL CLOSE

UNIVERSITY OF CENTRAL FLORIDA
1963

COCOA
FLORIDA

CITY OF ORMOND BEACH
FLORIDA

PONCE INLET
1887
Joy of the Land and Sea
1963
FLORIDA

LAKE HELEN
FLORIDA

STETSON UNIVERSITY

Volusia League of Cities
Cities coming together

The Nature Conservancy
Protecting nature. Preserving life.

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