Clean Energy/ Cleantech

Summary of New Programs in Rural Utilities Service

USDA Rural Development
U.S. DEPARTMENT OF AGRICULTURE

	PACE	New ERA
Eligible Activities	▪ Renewable power generation from: wind, solar, geothermal, hydropower, or biomass ▪ Storage for or with renewable energy	▪ Purchase of clean energy systems, the construction of clean energy systems, or the purchase of clean energy power ▪ Renewable enabling technologies including storage and distributed clean energy generation as part of a clean energy generation project ▪ Zero-emission technologies, including carbon capture and storage (CCS), nuclear, as well as utility-controlled demand side management systems ▪ Transmission and renewable generation energy efficiency measures
Eligible Applicants	▪ Any entity eligible to borrow from RUS ▪ Applicants must serve an area with at least 50 percent rural consumers	▪ Electric cooperatives that are current or former RUS or REA borrowers, electric cooperatives serving predominantly rural areas, or wholly or jointly owned subsidiaries ▪ Generation, transmission, or distribution cooperatives
Funding and Financing	▪ Loans at the municipal rate with partial forgiveness: • Up to 20 percent for eligible applicants • Up to 40 percent for energy dependent or disadvantaged communities • Up to 60 percent for Tribal communities, Alaskan villages, Alaska Native Corporations, Hawaiian homelands, US territories, or compact states ▪ PACE program size: $1 billion	▪ Grants up to 25 percent of total project cost; ▪ Loans from zero percent interest to the federal government's cost of money; no maximum loan value ▪ Zero percent interest refinancing available for stranded assets to invest in eligible projects and for distressed, disadvantaged, or energy dependent communities ▪ New ERA program size: $9.7 billion
Deadlines	▪ Accepting Letters of Interest between June 30 and September 29, 2023 ▪ Not competitive and processed on a rolling basis	▪ Accepting Letters of Interest between July 31 and August 31, 2023 ▪ Competitive scoring based on the greatest reduction in greenhouse gas emissions
Stacking of Incentives	Stacking federal incentives is generally allowed by RUS. No double payment for the same activity is permitted. Check with relevant federal agencies for stacking guidance regarding their programs.	

Learn more about PACE and New ERA at https://www.rd.usda.gov | USDA is an equal opportunity provider, employer, and lender.

Energizing the EV Revolution

Crystal Stiles, Florida Power & Light Company

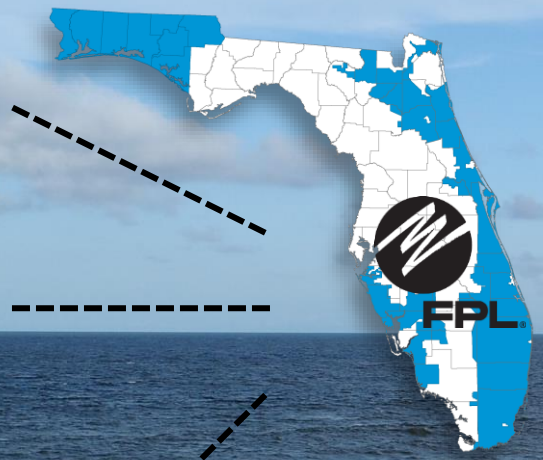
Executive director of development for distributed technologies & mobility

FPL is the largest energy company in Florida

Serving customers from **Miami to Pensacola**

12 million people

43 counties

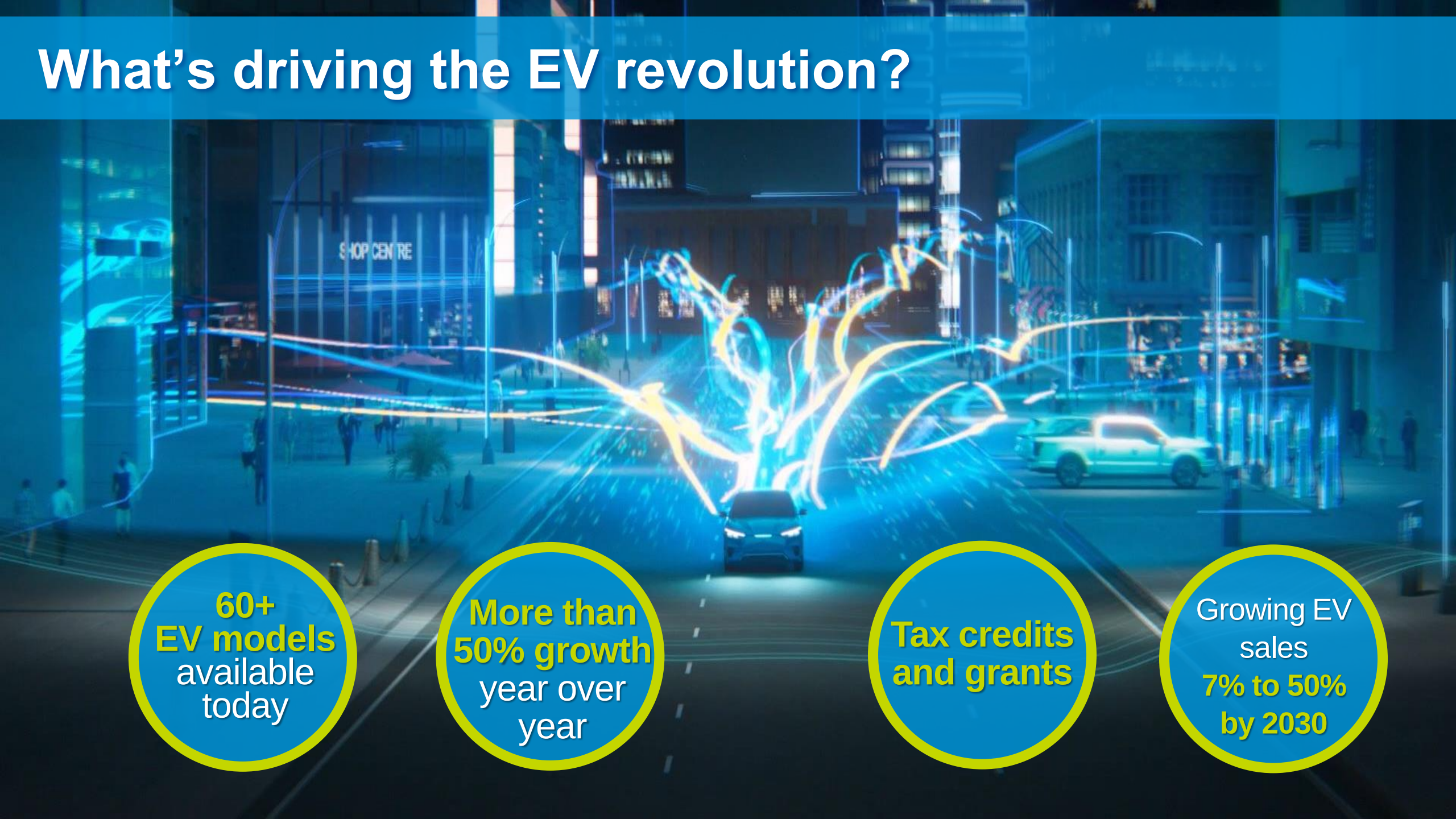


NEXTera® ENERGY

- Fortune 200 & ranked No. 1 in the electric and gas utilities industry on Fortune's list of "Most Admired Companies" for the 16th time in 17 years
- Recognized on Fortune's 2021 list of companies that "Change the World"
- Headquartered in Juno Beach, Florida, with a presence in 49 states and four Canadian provinces

FPL

What's driving the EV revolution?



60+ EV models available today

More than 50% growth year over year

Tax credits and grants

Growing EV sales **7% to 50% by 2030**

Florida’s rapid EV expansion

Florida
#2 in nation
for EVs

EVs expected
to grow in FL
~1,000%
by 2030

170,000+
EVs in FL

1 of every 4
vehicles sold in the U.S. will be **electric** by 2027[4]

2.9+ MM
EVs on the road
1% of vehicles in the U.S.

The FPL EVolution® fast charging network is positioned to significantly enhance Florida's public charging ecosystem

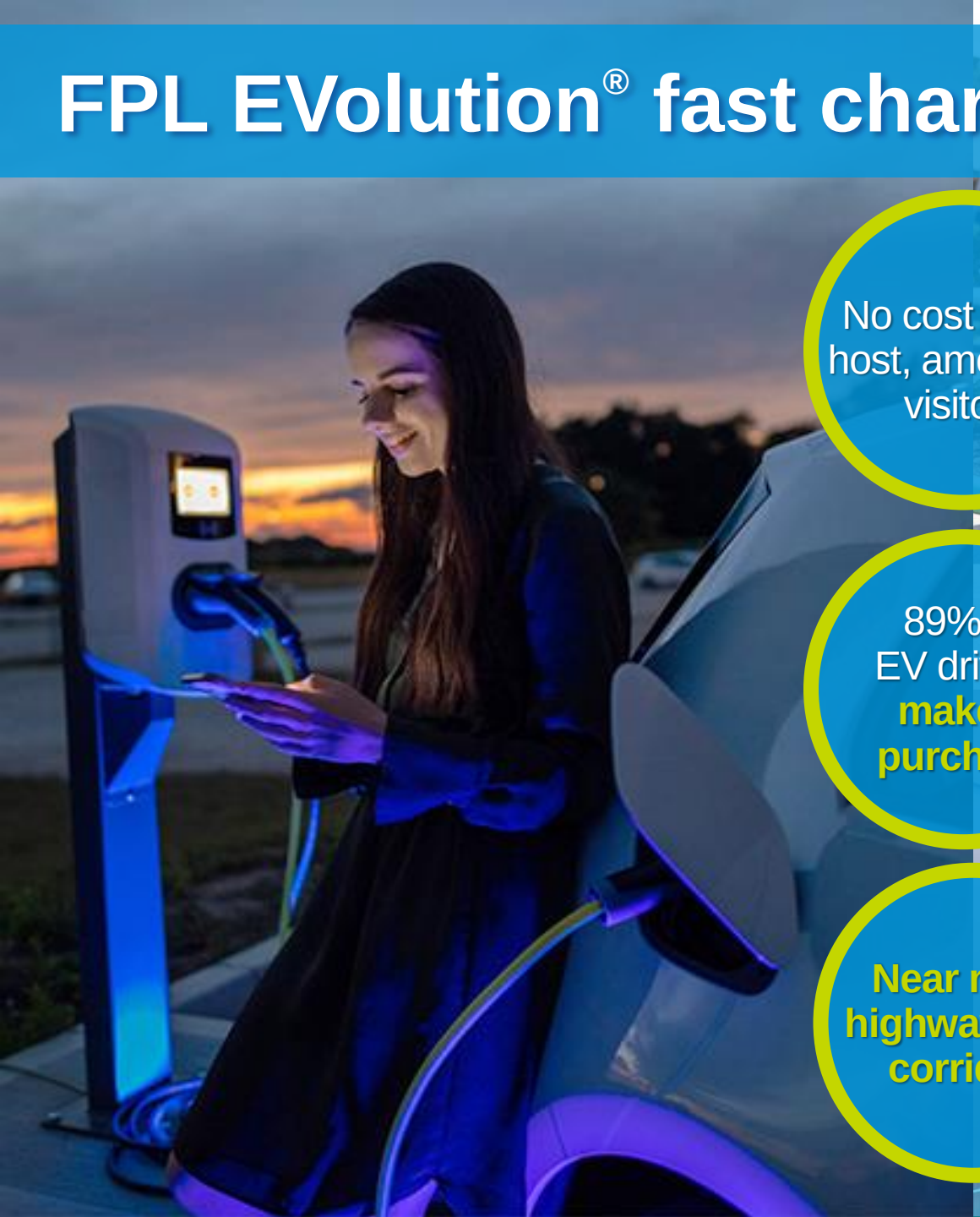
$100 MM
to expand public fast charging network

Fast charging approx. every **50 miles** along Florida's main highways

State needs **5,000+** charging ports by 2026

Unlocking charging for **rural and less-traveled highways**

FPL EVolution® fast charging stations across Florida



No cost to site host, amenity to visitors

89% of EV drivers **make a purchase**

Near major highways and corridors

No impact to electric bill

Partnering with multiple state agencies to deploy public charging equipment

Municipal, destination and business **partnerships**

DOT fast charging at service plazas & Level 2 at offices

FDEP grants to install DC fast chargers

5 school districts **300 electric school buses**

Supporting EV industry with educational programs that offer practical, hands-on experience

Electrathon challenges students to design, build + test EVs

Encourages **teamwork + critical thinking**

Supports **next generation** of EV drivers

Inspires careers in **STEM**

FPL's EV infrastructure stood strong during Hurricane Ian

EV charging ports directly in Ian's path

Cat 4 Hurricane
72-hour impact

FPL EVolution® Home offers unlimited at-home charging for a low, flat monthly price

No up-front cost **$38 per month**

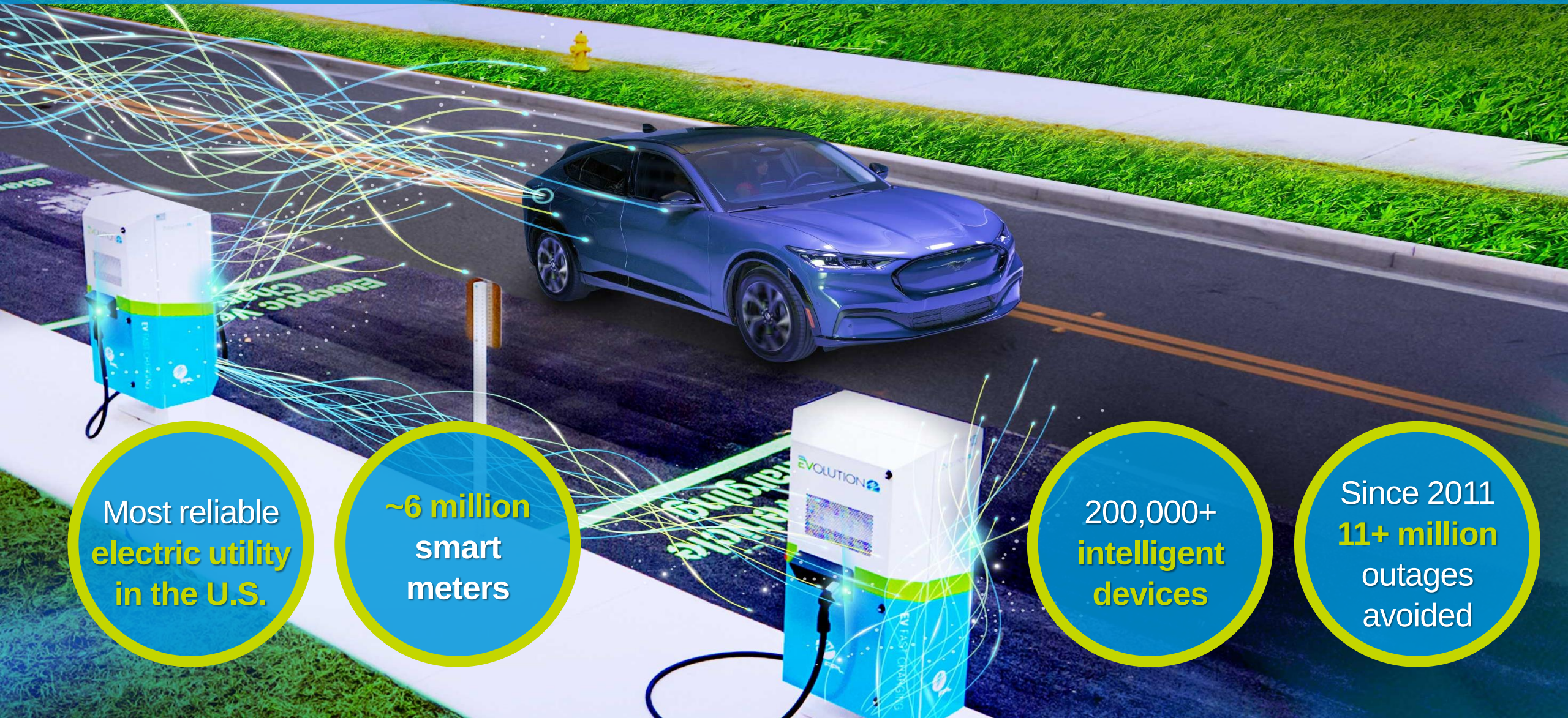
Fixed rate **level 2** subscription

Off-peak **unlimited** charging

FPL EVolution® **App** smart charging control

FPL EVolution® Fleet provides turnkey solutions for companies and municipalities to electrify their fleets

FPL is building the strongest, smartest energy grid in the U.S.



Most reliable **electric utility in the U.S.**

~6 million smart meters

200,000+ **intelligent devices**

Since 2011 **11+ million** outages avoided

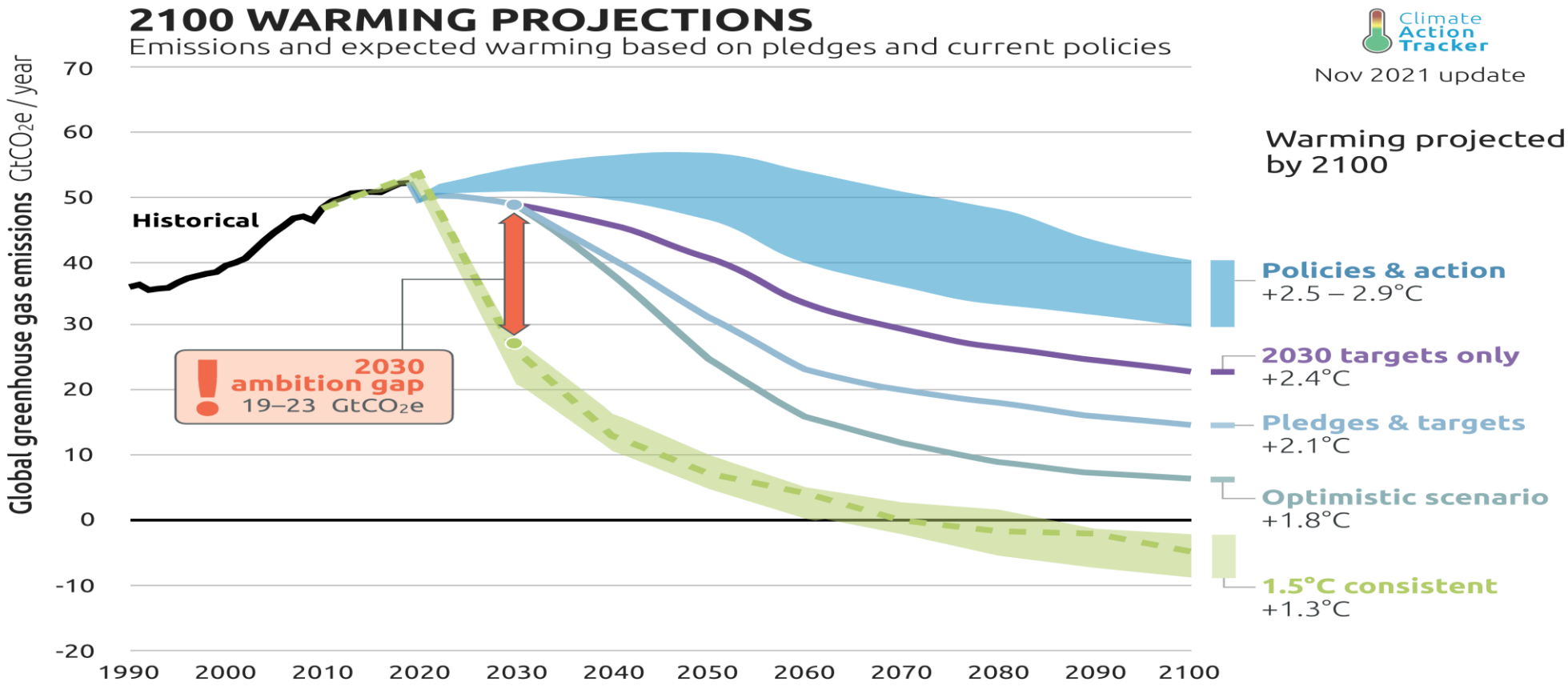
Fueling the Future: Hydrogen's Role in Reshaping Energy

Jason Jermark

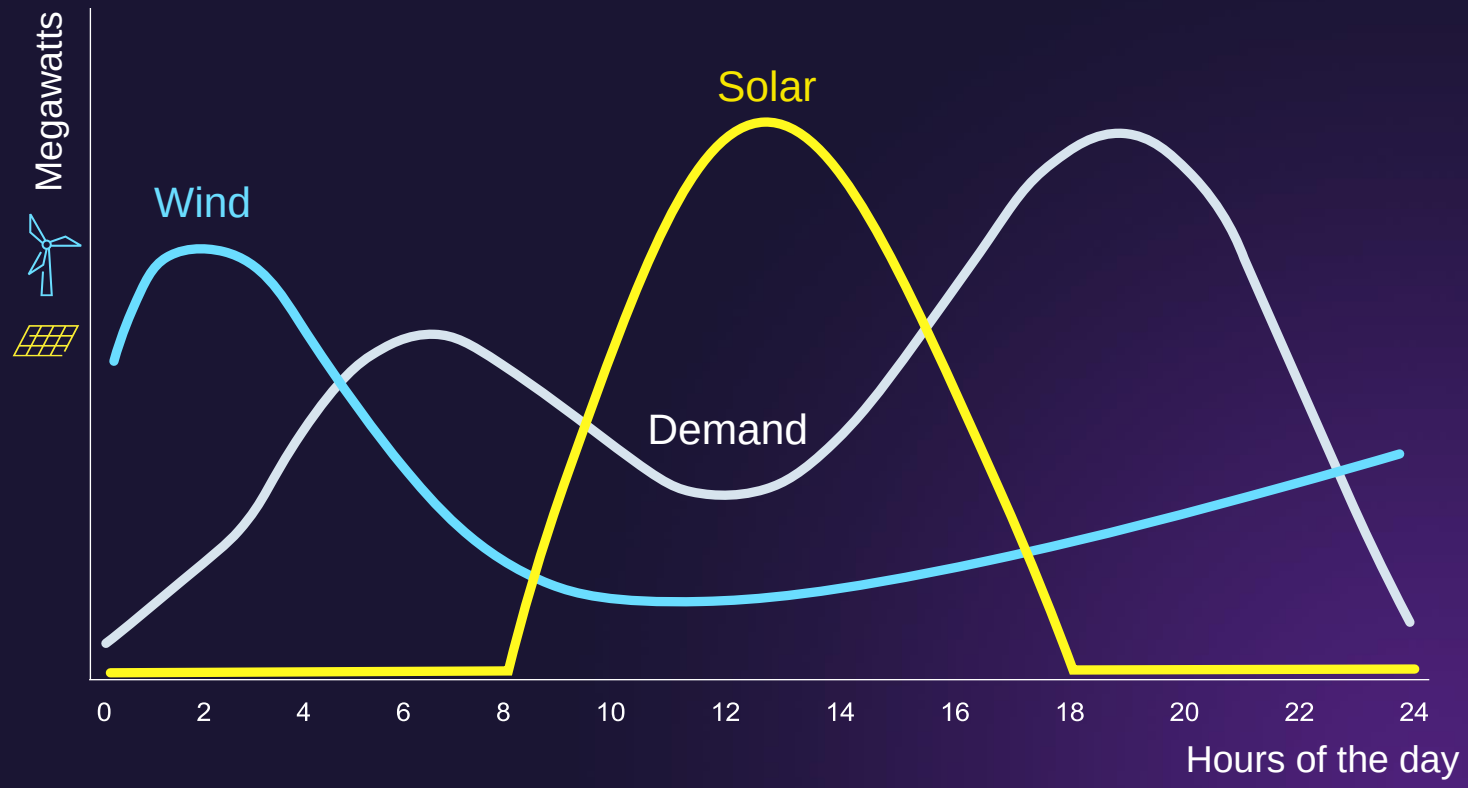
August 2023

To reach decarbonization targets, we need to eliminate CO_2 emissions to limit global warming

Emissions and expected warming based on pledges and current policies



Why hydrogen – the changing grid



Modern Grid

- Increasing renewables
- Peaks and out of sync
- Flexible resources required to adapt to fluctuating renewables

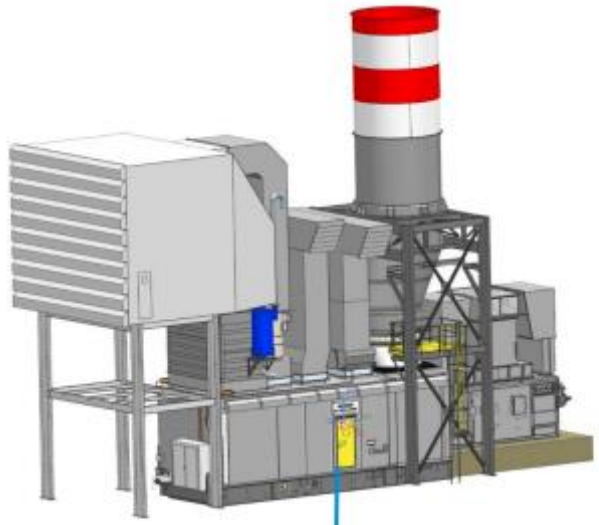
Wind and solar create a new reality for other generation sources

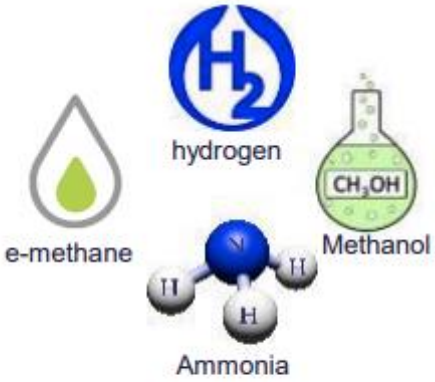
How to reduce Carbon emissions:
Hydrogen co-firing and carbon capture

SIEMENS energy

Replace or blend the gas turbine's fuel supply with Carbon free/neutral fuels

Post Combustion Capture & storage of carbon emissions





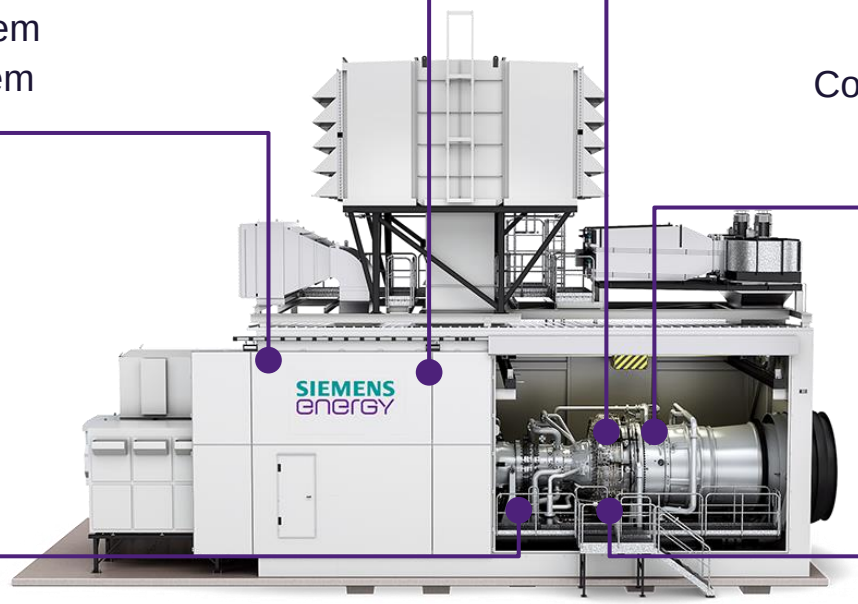
Improve Efficiency use less fuel

Relatively simple modifications need to be made for existing natural gas plants to burn Hydrogen

Main systems requiring modification when upgrading to higher H_2 content

Fire Protection System
Gas Detection System

Gas Group IIC[1]
electrical equipment



H_2 compatibility of plant
auxiliary and peripheral systems

Additional Flame Control and
Combustion Monitoring Systems

Burner Adjustment/Exchange
Purging system

Fuel Gas System
material and set-up

Consequences and solution

- Project specific evaluation and decision on required modifications
- Power output control to ensure compliant NOx emission levels
- Conventional/non-H_2 fuels may be required for start-up and shutdown
- Re-certification with respective authorities might be required

1 In NFPA regions alternatively NEC 500 Class I Div 2 Group B

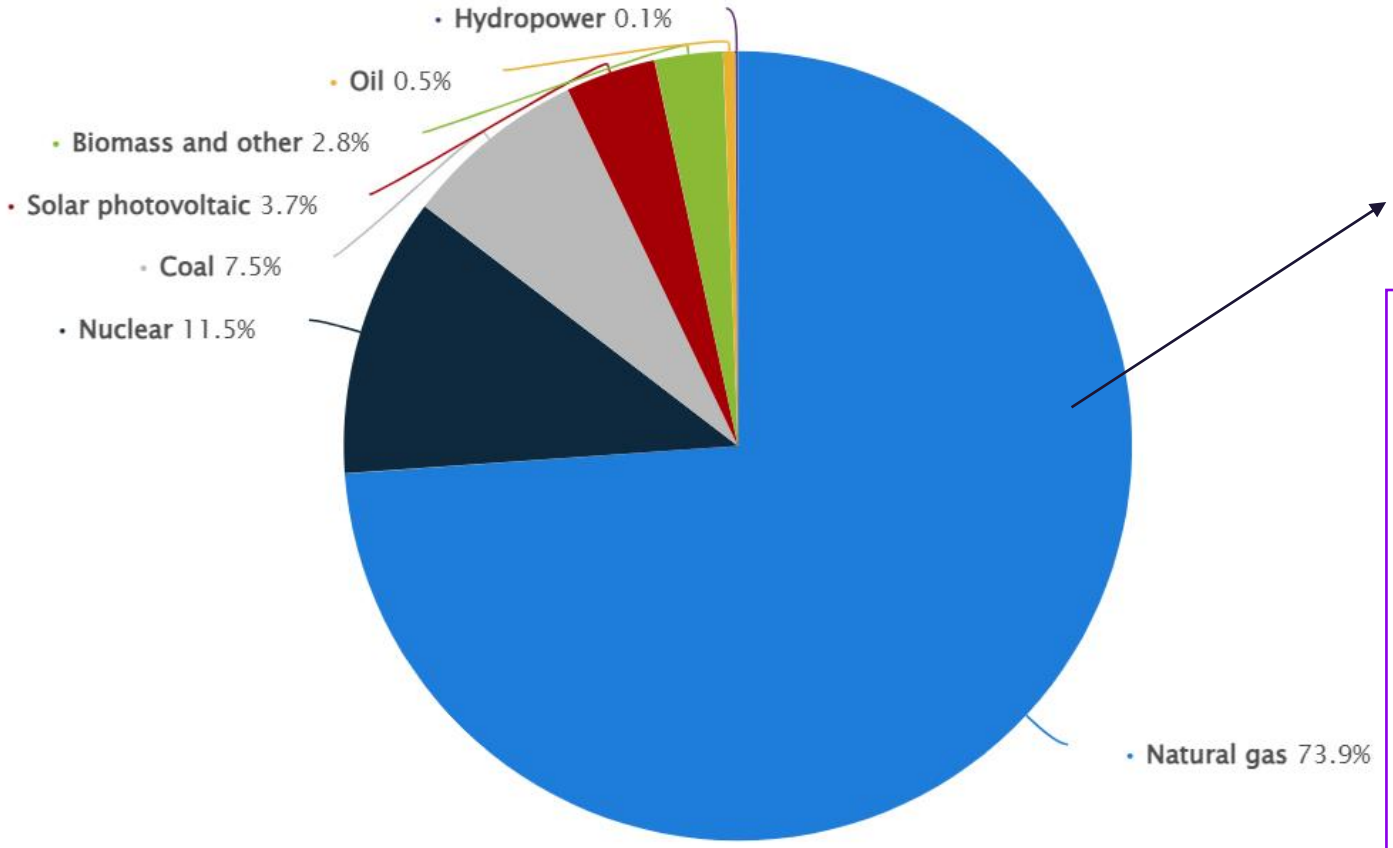
Customers are helping to prove that large power plants can co-fire high volumes of hydrogen

SGT6-6000G
38% Hydrogen

Customer: Constellation
Country: United States
Plant Size: 753 MW 2x2x1
Combined-cycle

“This test proved what we’ve suspected for years -- that **blending clean hydrogen with natural gas can safely reduce emissions without major modifications to an existing plant that’s well over a decade old,” said Joe Dominguez, president and CEO of Constellation.** “As the EPA and numerous climate experts have acknowledged, the availability of affordable clean hydrogen at scale will be essential if we are going to prevent the ravaging effects of climate change.”

Florida impacts – Natural gas is the low hanging fruit



The **United States** has set a goal of 100% clean electricity by 2035, a crucial foundation for **net-zero emissions no later than 2050.**

Hydrogen co-firing of **existing natural gas plants** will help Florida reach these goals.

Utilities such as **NextEra** are implanting ambitious goals in Florida:

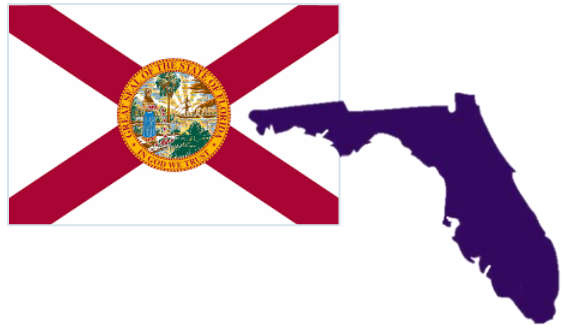
- Real Zero™ means **eliminating** carbon emissions from our operations. Not to be confused with Net zero which means reducing carbon and acquiring traditional offsets or credits.

•Goal is to be completely carbon emissions-free by no later than 2045.

Reference: Statista Research Department April 11, 2023

Backup Slides

Siemens Energy Powering Florida Companies and Communities



3400+ employees	Generation, Transmission and Industrial Applications employees
1 major locations	Major location in Orlando
65+ years in FL	Providing power equipment for decades
270+ FL suppliers	Partnering with a vast network of FL companies

29% of total FL generation capacity	Leveraging fossil and nuclear at facilities state-wide
$322M Transmission equipment installed in FL in last 10 years	SE deployed equipment maintains the FL grid
$97M spent on supply chain annually	Purchasing goods and services from FL companies

Siemens Energy calls Florida Home

3400+ employees

65+ years in Florida

1 major location

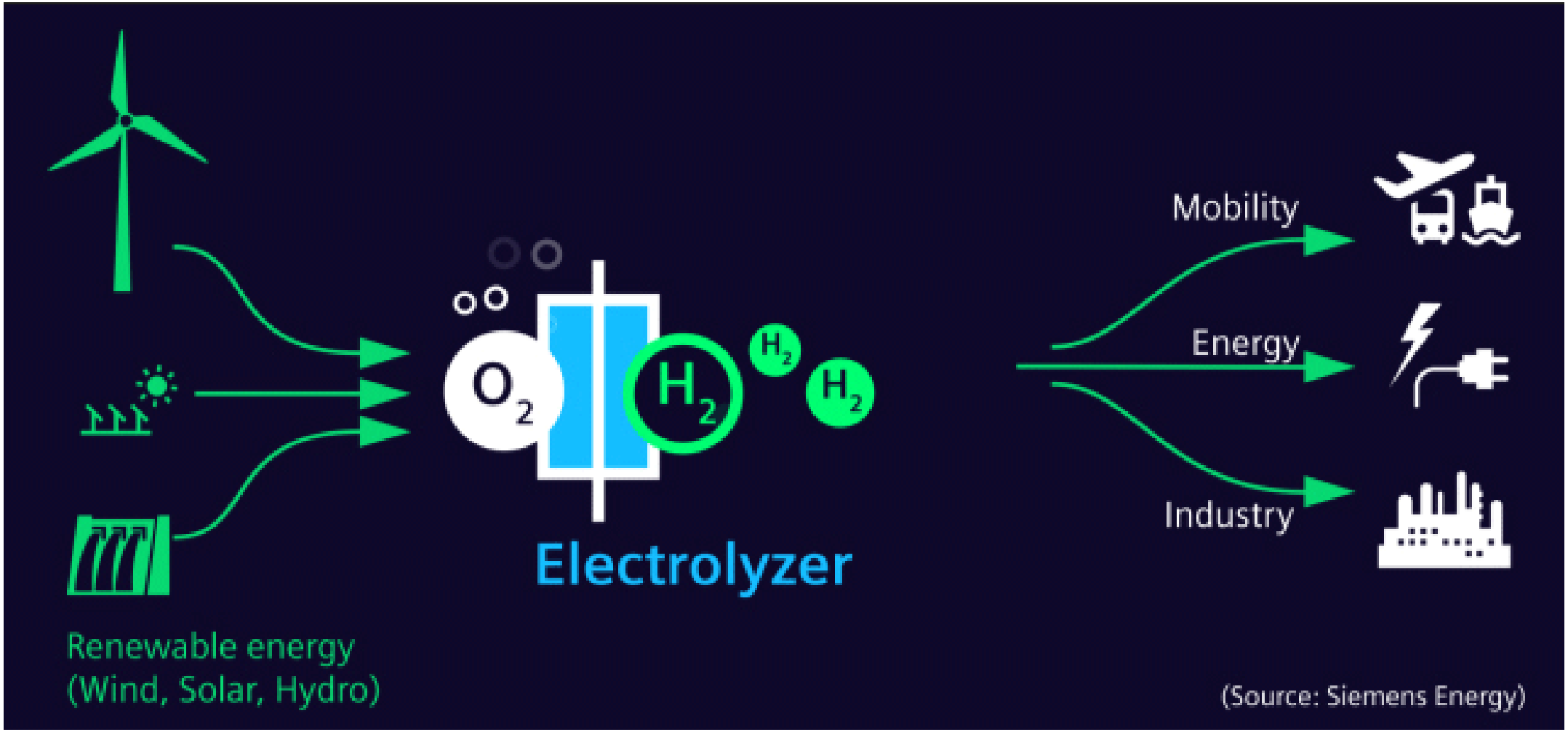
270+ Florida suppliers

29% of total Florida Generation capacity

$97M spent with Florida suppliers annually

$322M Transmission equipment installed in Florida in last 10 years

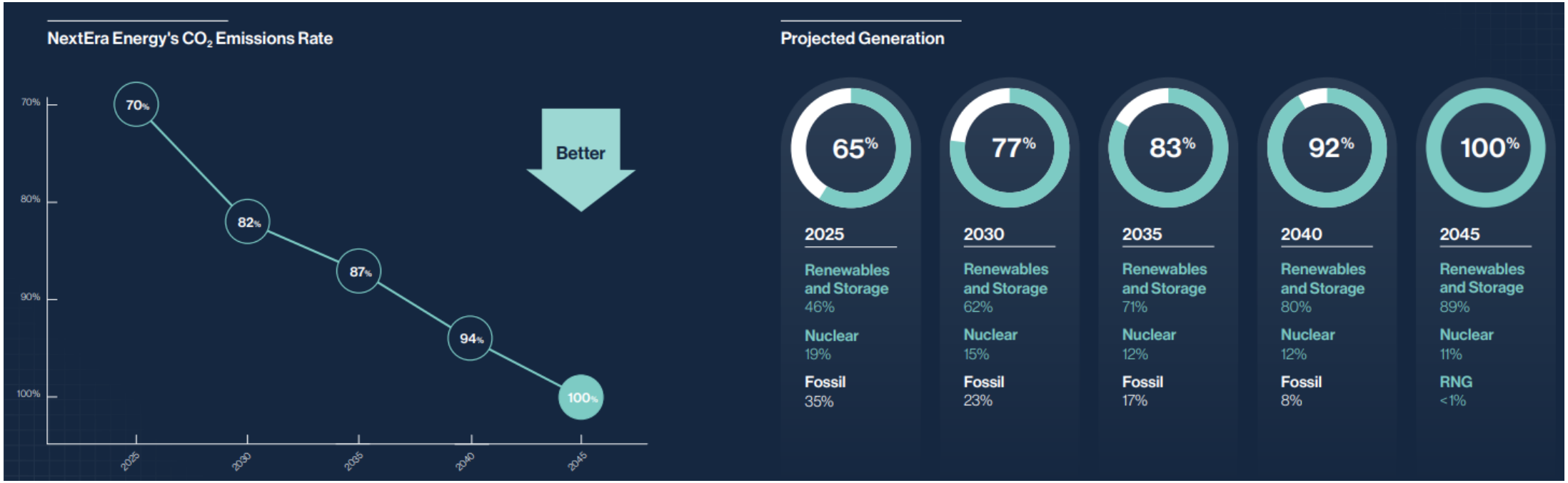
Hydrogen is applicable to other industries that are looking to decarbonize as well



Back-up for Next Era

- Real Zero™ means eliminating carbon emissions from our operations. Not to be confused with Net zero which means reducing carbon and acquiring traditional offsets or credits.
- Goal is to be completely carbon emissions-free by no later than 2045. Our plan includes meaningful milestones in five[1]year increments that would allow us to reach Real Zero emissions by no later than 2045. Our Real Zero goal is the most ambitious target set by an energy producer and the sector's only one to not require carbon offsets for success.
- History of performance: From 2005 to 2021, our CO2 emissions rate improved from 37% better to 51% better than the U.S. electric power sector average. Over that same time period, our total generation capacity increased 72% to meet growing customer demand.
- Real Zero means our power generation would come from 100% carbon emissions-free energy sources at no incremental cost to our customers relative to alternatives
- NextEra currently use SF 6 gas, another potent greenhouse gas, as part of our transmission equipment. We recognize that any emissions from SF 6 need to be reduced and eliminated from our transmission operations. We commit to fully eliminating SF 6 emissions from operations by no later than 2045, if not sooner.
- FPL would accelerate the transformation of the generation mix, reaching 36% decarbonization by 2025; 52% by 2030; 62% by 2035; 83% by 2040; and culminating in 100% decarbonization by no later than 20456.

Back-up for Next Era




U.S. DEPARTMENT OF
ENERGY
Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY
water
U.S. DEPARTMENT OF
ENERGY
Office of ENERGY EFFICIENCY
& RENEWABLE ENERGY
WATER POWER TECHNOLOGIES OFFICE
Marine Energy

The Water Power Technologies Office

WPTO Marine Energy Program Mission:

Harness energy from the world's oceans

- Waves
- Tides
- Ocean Current
- River Current
- Thermal Gradients
- Salinity Gradients
- Pressure Gradients

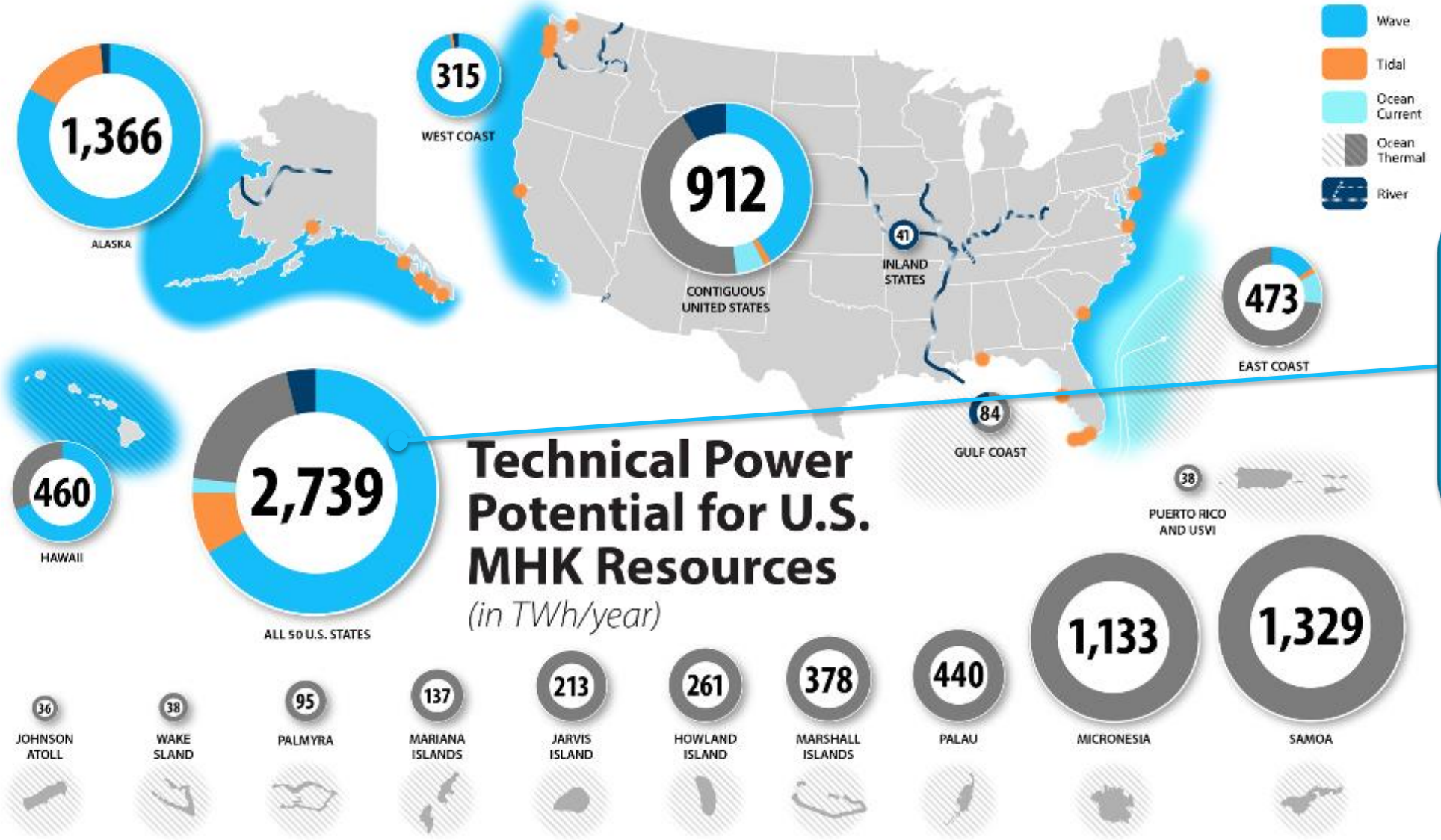
Oneka – Nags Head, North Carolina

CalWave – San Diego, California

NREL HERO WEC – Nags Head, North Carolina

Verdant Power – New York, New York

The Size of the Marine Energy Resource is Significant



Equivalent to 57% of electricity generated in the U.S. in 2019

https://www.energy.gov/eere/water/articles/marine-energy-united-states-overview-opportunities

Near-term opportunities for marine energy

WPTO invests in grid-scale and non-grid scale technologies.

MARINE CARBON DIOXIDE REMOVAL (mCDR)

- Marine energy-powered monitoring and measurement technology to understand the efficacy and potential environmental effects of carbon removal techniques
- Marine energy-powered mCDR approaches

OCEAN OBSERVATION

- Increased uptime (better measurement continuity, longer data sets) and greater area coverage
- Decreased field service visits

AQUACULTURE

- Power for lighting, feeding, monitoring, and transporting

Challenges of marine energy

- **Marine energy technologies are expensive.** We need to do a lot more research, development, and testing to reduce costs and improve the performance of these devices. Government funds can only take projects so far.
- **The ocean is not an easy place to operate machinery.** We are still learning about what types of materials and device designs can best survive in the rough ocean environment.
- There are **not many facilities** where marine energy researchers can test their devices.
- Marine energy developers need **go through significant licensing** to test their machines in the ocean, and it can take years to secure these approvals.

Selected Projects of Interest

SNMREC

FAU
SOUTHEAST NATIONAL MARINE RENEWABLE ENERGY CENTER

- The Southeast National Marine Renewable Energy Center at Florida Atlantic University seeks **to advance the science and technology of recovering energy from the oceans' renewable resources**, with special emphasis on those resources available to the southeastern US: initially focusing on **ocean currents and offshore thermal resources**. By playing a leadership role, the SNMREC helps promote economic development and energy independence for the nation.
- Congressional funding:
  - Bipartisan Infrastructure Law (BIL) supplies $40M for the National Marine Energy Centers, including SNMREC – WPTO is working through requirements to make those funds available
  - FY23 appropriations language around supporting operations & maintenance for the NREMCs – WPTO is working through requirements to make those funds available
- https://snmrec.fau.edu/index.html

FAU in TEAMER

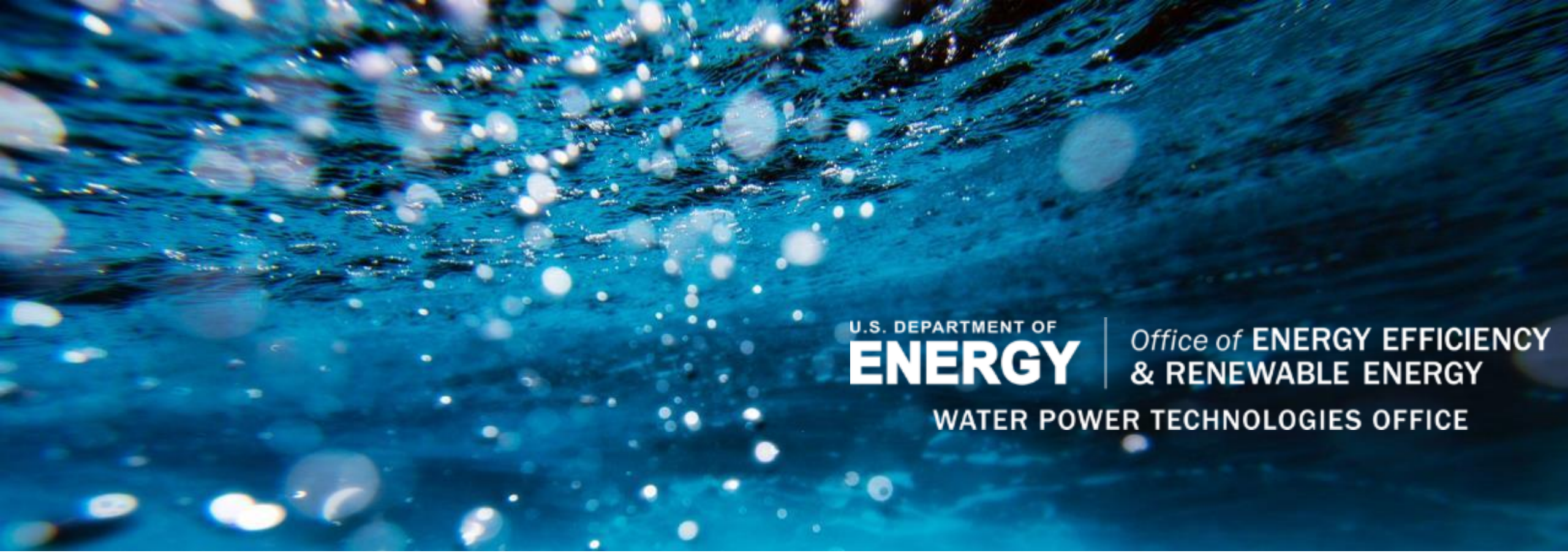
- The Testing Expertise and Access for Marine Energy Research (TEAMER™) program, sponsored by the U.S. Department of Energy (DOE) and directed by the Pacific Ocean Energy Trust (POET), **releases open funding calls to support marine energy developers seeking access to the nation's best facilities and expertise.**
- FAU is a TEAMER facility, and offers expertise in:
  - Control systems engineering support
  - IEC technical specification design
  - Mooring dynamics simulation
  - Power performance modeling
  - Turbine hydrodynamics
  - Array integration modeling
  - Environmental modeling

FAU
FLORIDA ATLANTIC UNIVERSITY

TEAMER
Testing & Expertise for Marine Energy

Mobile Test Vessel (MTV)

- To fill the testing capability gap of testing large turbines (3-8 m rotor diameter), a mobile test vessel (MTV) will be developed and fabricated for current energy converter devices. The MTV is adaptable to a variety of current speeds, depths, wave conditions and sea-bed types.
- Partners: FAU, IDOM, Sandia National Laboratory (SNL), National Renewable Energy Laboratory (NREL), and Pacific Northwest National Laboratory (PNNL)
- Timeline: October 2021 – September 2025
- Funding: $5,556,000 ($5M DOE, $556,000 cost share)
- Currently in BP1 focusing on requirements development & design



Thank you & questions

carrie.schmaus@ee.doe.gov

August 16, 2023

Center for Climate and Energy Solutions Regional Roundtable Program

Stephanie Gagnon

Manager, Regional Programs

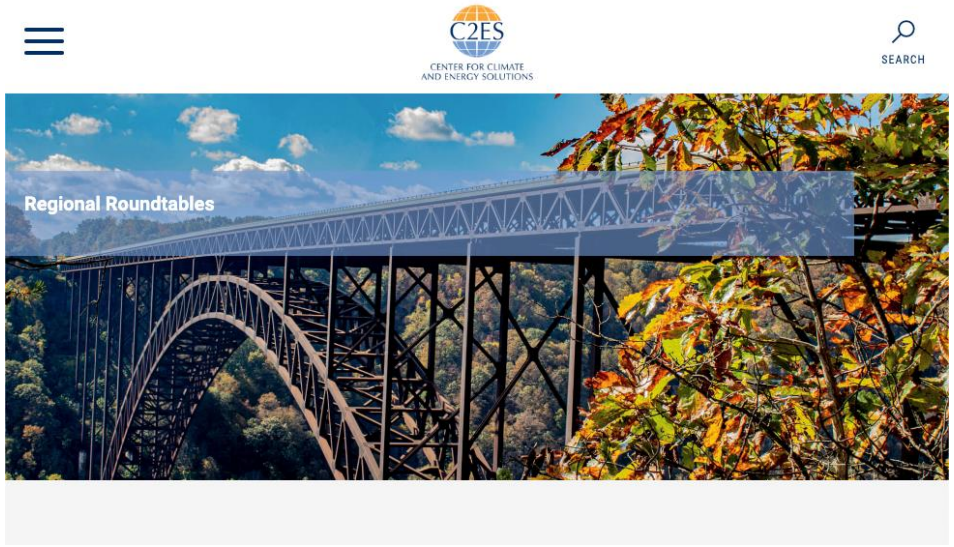
C2ES.ORG

Center for Climate and Energy Solutions

- The Center for Climate and Energy Solutions works to secure a safe and stable climate by accelerating the global transition to net-zero greenhouse gas emissions and a thriving, just, and resilient economy.
- Business Environmental Leadership Council (BELC):

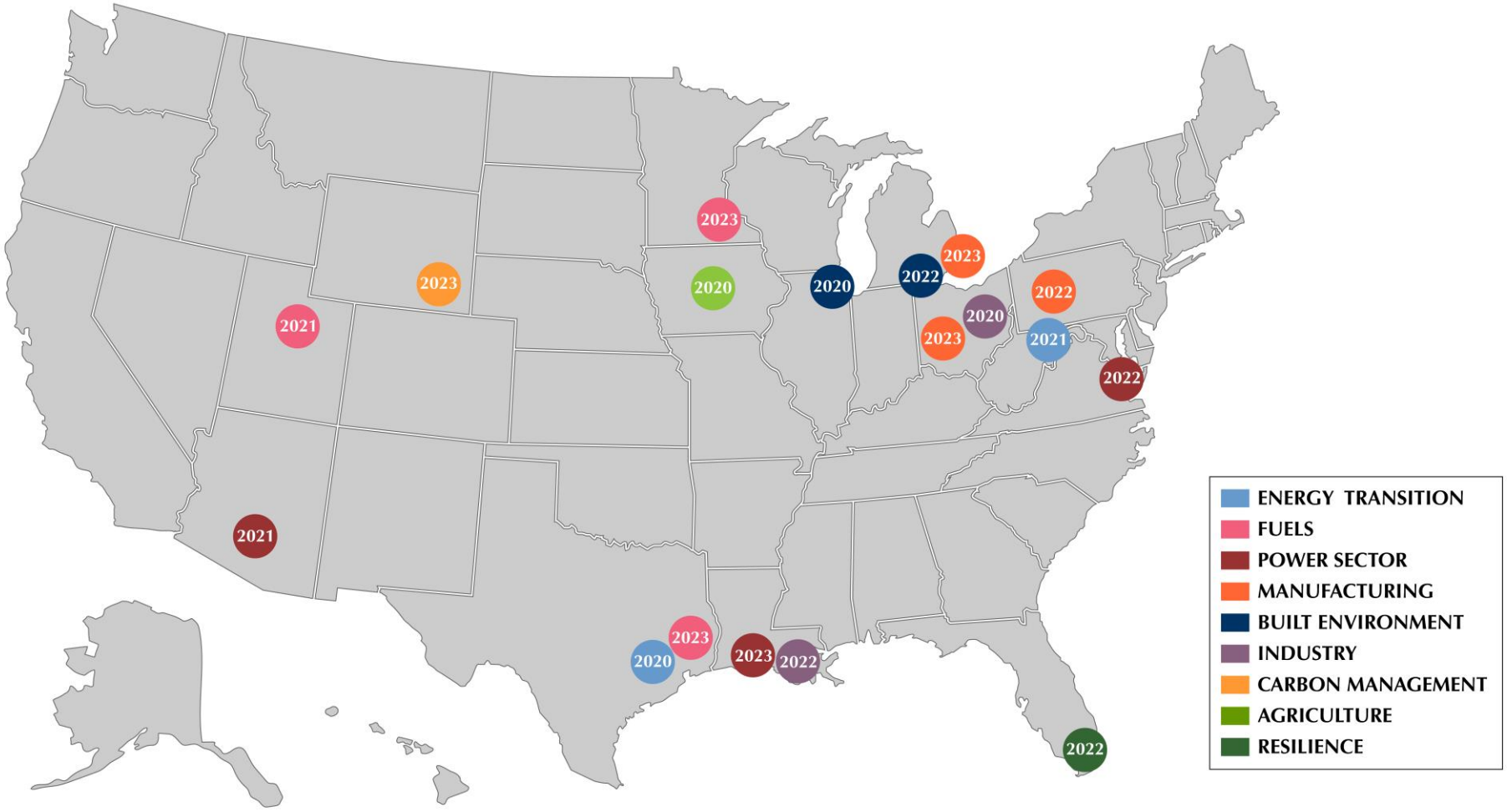
Regional Roundtables

- Purpose:
  - Elevate the perspectives of a diverse set of stakeholders deeply embedded in their communities and uniquely positioned to speak to the needs of their states and regions;
  - Create opportunities to integrate local perspectives into state and federal policy contexts;
  - Identify concrete steps to better align the long-term vitality of these communities with the urgent task of facilitating economy-wide decarbonization.
- Participants include:
  - local, state, and federal policymakers;
  - businesses of all sizes;
  - community organizations and nonprofits;
  - leading academics and issue experts;
  - trade associations and labor organizations;
  - Investors and philanthropy.



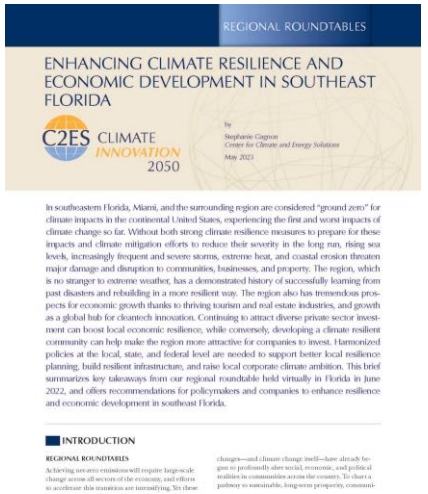
- https://www.c2es.org/accelerating-the-us-net-zero-transition/regional-roundtables/

Regional Roundtables



Enhancing Climate Resilience and Economic Development in SE Florida

- Opportunities
  - Attract cleantech investment
  - Integrate climate awareness into long-term planning
  - Support communities' resilience to chronic climate impacts and improve disaster preparedness
  - Accelerate post-disaster recovery
- Recommendations
  - Collect and disseminate data & information
  - Incorporate equity
  - Build resilient infrastructure
  - Build an ecosystem of climate innovation


REGIONAL ROUNDTABLES

ENHANCING CLIMATE RESILIENCE AND ECONOMIC DEVELOPMENT IN SOUTHEAST FLORIDA

C2ES CLIMATE INNOVATION 2050

by
Stephanie Cagnon
Center for Climate and Energy Solutions
May 2023

In southeastern Florida, Miami, and the surrounding region are considered "ground zero" for climate impacts in the continental United States, experiencing the first and worst impacts of climate change so far. Without both strong climate resilience measures to prepare for those impacts and climate mitigation efforts to reduce their severity in the long run, rising sea levels, increasingly frequent and severe storms, extreme heat, and coastal erosion threaten major damage and disruption to communities, businesses, and property. The region, which is no stranger to extreme weather, has a demonstrated history of successfully learning from past disasters and rebuilding in a more resilient way. The region also has tremendous prospects for economic growth thanks to thriving tourism and real estate industries, and growth as a global hub for cleantech innovation. Continuing to attract diverse private sector investment can boost local economic resilience, while conversely, developing a climate resilient community can help make the region more attractive for companies to invest. Harmonized policies at the local, state, and federal level are needed to support better local resilience planning, build resilient infrastructure, and raise local corporate climate ambition. This brief summarizes key takeaways from our regional roundtable held virtually in Florida in June 2022, and offers recommendations for policymakers and companies to enhance resilience and economic development in southeast Florida.

INTRODUCTION

REGIONAL ROUNDTABLES

Achieving net-zero emissions will require large-scale change across all sectors of the economy, and efforts to accelerate this transition are intensifying. Yet these changes—and climate change itself—have already begun to profoundly alter social, economic, and political realities in communities across the country. To chart a pathway to sustainable, long-term prosperity, communi-

FOR MORE INFORMATION

C2ES.ORG

For More Information, Please Contact:

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