UNISON ENERGY

Resiliency: What is your 96-Hour Plan?

FHEA 2024 Trade Show & Educational Conference

June 2024

Florida Ranks #8 in the U.S. for the Most Long-Term Area Power Outages

According to the data, the states with the most 96 hour plus power outages over the past 3 years are as follows:

Rank	State	Total Electrical Disturbances Past 3 Years	% Change
1	Texas	191	8.33%
2	California	167	23.21%
3	Washington	83	24.00%
4	Louisiana	58	-33.33%
5	Kansas	49	16.67%
6	Michigan	46	14.29%
7	Maine	45	-36.36%
8	Oregon	41	0.00%
8	Florida	41	53.85%
10	New York	39	-12.50%

Source: U.S. Energy Information Administration Ref ESPN News

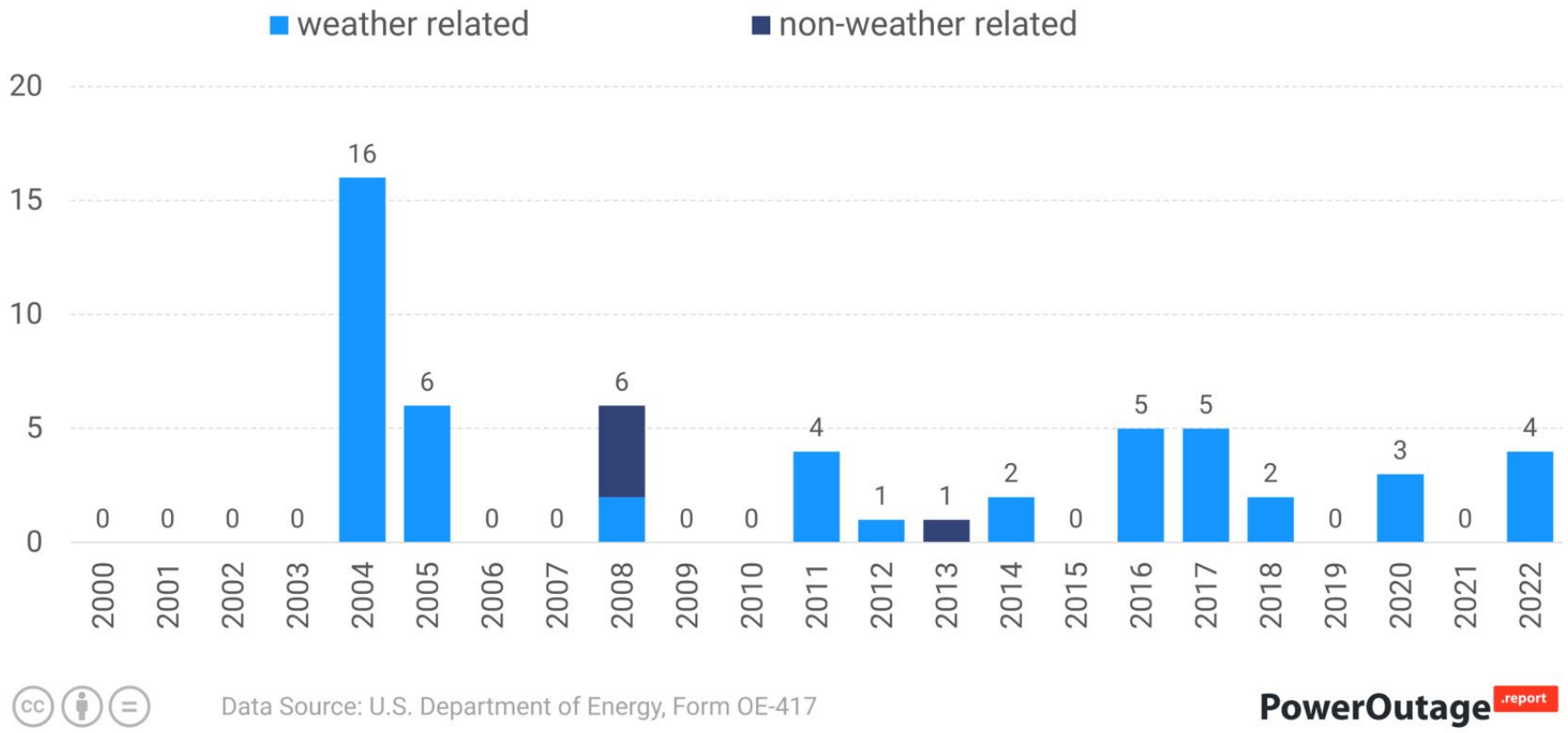
Florida in the #10 in the U.S. for Number of Local Blackouts

1. Eaton – Blackout Tracker Annual Report – Figure 1

The Need for Resiliency

Power Outages in Florida

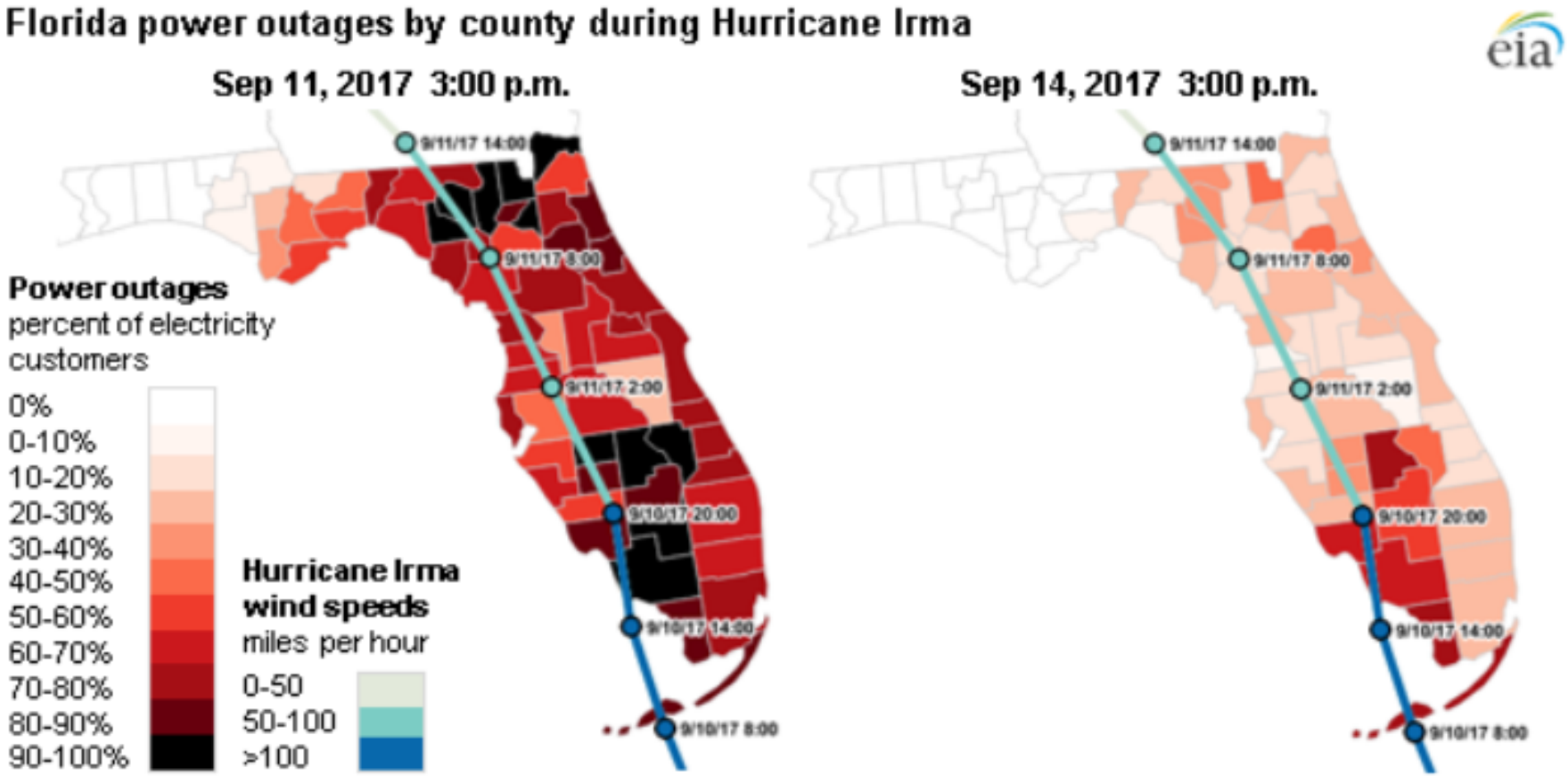
Number of outages affecting Florida and at least 50,000 customers from 2000 to 2022



Data Source: U.S. Department of Energy, Form OE-417

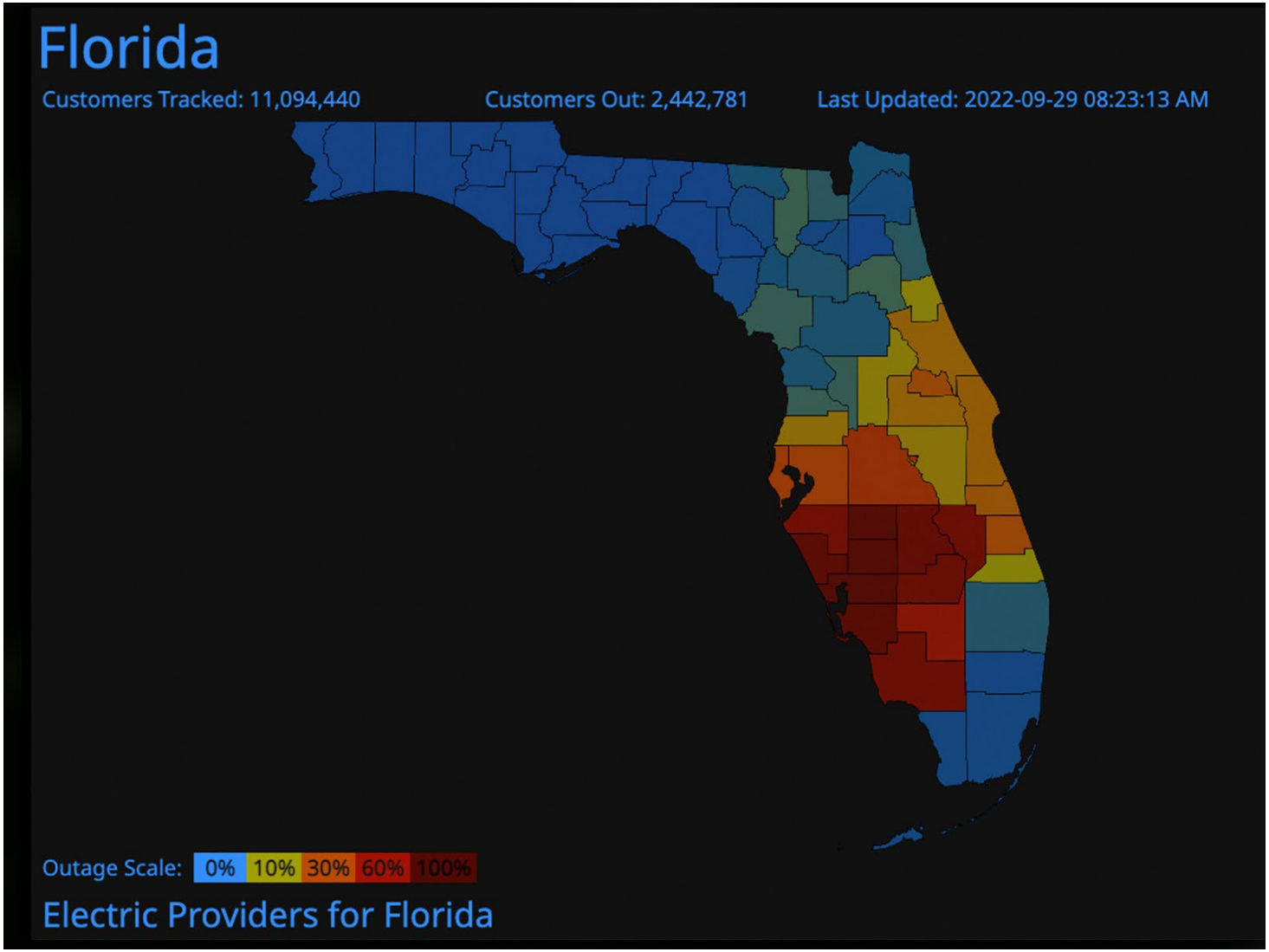
PowerOutage.report

The Need for Resiliency Due To Irma (65.6hrs average outage)



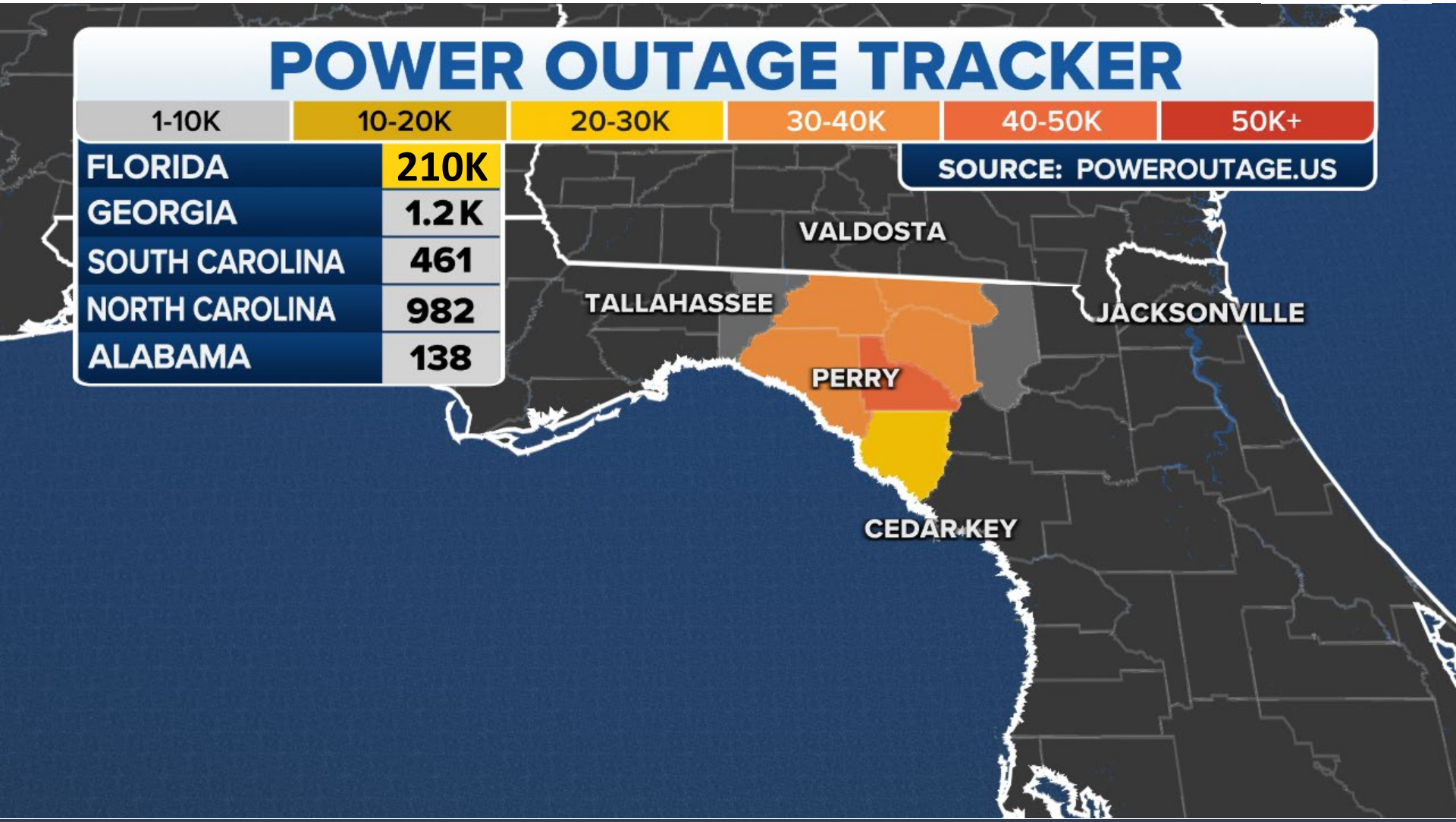
Source: U.S. Energy Information Administration based on data from Florida Division of Emergency Management and NOAA National Hurricane Center

The Need for Resiliency Due To Ian Over 2.5 Million Customers



SOURCE: POWEROUTAGE.US

The Need for Resiliency Due To Idalia Over 210 Thousand Customers



SOURCE: WEATHER CHANNEL

Florida's Aging Utility Infrastructure

Power quality issues cause internal equipment damage and costly distribution repairs, eventually causing permanent damage and or failure

- ✓ Storms / Severe Weather
- ✓ Overloaded Grid
- ✓ Blackouts
- ✓ Brownouts
- ✓ Vandalism
- ✓ Power Surges
- ✓ Voltage Droops
- ✓ Loss Of Phase
- ✓ Accidents
- ✓ Stupidity

Emergency Power Codes – Configurations/Sources

Changes (adoption date 1/1/2023) (NFPA 99/2019 NFPA 110)

- NFPA 99 will allow generator, batteries, fuel cells and Microgrids as EPS's
- NFPA 99 states that Microgrids can be used as Emergency Power Sources if
- "Designed with sufficient reliability to provide effective facility operation consistent with the facilities emergency operations plan."

NFPA Requirements

- All hospitals, nursing homes, and ambulatory surgery centers in the State of Florida are required to have a Level 1 Emergency Power Supply System (EPSS).
- Fuel storage required 133% of the full power time requirement.

Table 4.1(a) Classification of EPSSs

Class	Minimum Time
Class 0.083	0.083 hr (5 min)
Class 0.25	0.25 hr (15 min)
Class 2	2 hr
Class 6	6 hr
Class 48	48 hr
Class X	Other time, in hours, as required by the application, code, or user

Table 4.1(b) Types of EPSSs

Designation	Power Restoration
Type U	Basically uninterruptible (UPS systems)
Type 10	10 sec
Type 60	60 sec
Type 120	120 sec
Type M	Manual stationary or nonautomatic — no time limit

Categorical Waiver – Health Care Microgrid Systems (HCMSs)

CMS Memorandum Summary 3/31/2023

- Various CMS regulations governing certain providers and certified suppliers require compliance with the 2012 edition of the National Fire Protection Association (NFPA) Health Care Facilities Code (NFPA 99).
- 2012 edition of NFPA 99 requires emergency power for an essential electric system (EES) to be supplied by a generator or battery system.
- 2021 edition of the NFPA 99 permits emergency power for an EES to be supplied by sources other than a generator or battery system, including a health care microgrid system (HCMS)
- HCMSs are small-scale electrical grids where the sources of electricity can be provided by clean energy technologies (e.g., fuel cells, solar, wind, energy storage, etc.).

Categorical Waiver – Health Care Microgrid Systems (HCMSs)

CMS Memorandum Summary

- Except as noted below, CMS is issuing a categorical waiver permitting new and existing health care facilities subject to CMS requirements to utilize alternate sources of power other than a generator set or battery system only if in accordance with the 2021 edition of the NFPA 99, 2023 edition of the National Electric Code (NFPA 70), and associated references.

- The categorical waiver excludes long-term care (LTC) facilities that provide life support as the LTC requirements at 42 CFR 483.90(c)(2) requires these facilities to have an emergency generator without exception.

42 CFR 482.15 (e) Emergency and Standby Power Systems

- (e) Emergency and standby power systems. The hospital must implement emergency and standby power systems based on the emergency plan set forth in paragraph (a) of this section and in the policies and procedures plan set forth in paragraphs (b)(1)(i) and (ii) of this section.
- (1) Emergency generator location. The generator must be located in accordance with the location requirements found in the Health Care Facilities Code (NFPA 99 and Tentative Interim Amendments TIA 12–2, TIA 12–3, TIA 12–4, TIA 12–5, and TIA 12–6), Life Safety Code (NFPA 101 and Tentative Interim Amendments TIA 12–1, TIA 12–2, TIA 12–3, and TIA 12–4), and NFPA 110, when a new structure is built or when an existing structure or building is renovated.
- (2) Emergency generator inspection and testing. The hospital must implement the emergency power system inspection, testing, and maintenance requirements found in the Health Care Facilities Code, NFPA 110, and Life Safety Code.
- (3) Emergency generator fuel. Hospitals that maintain an onsite fuel source to power emergency generators must have a plan for how it will keep emergency power systems operational during the emergency, unless it evacuates.

Basic 96hr Plan

Steps when power goes out

1. Activate Incident Command
2. Ensure Diesels Start / Emergency Power Source
3. Ensure Load Transfers / Emergency Power System
4. Call Utility
5. Work with appropriate stakeholders to confirm that required equipment is all functioning
6. Run like crazy through your SOP
7. Monitor emergency equipment
8. Order fuel if needed and if available
9. . . . Many additional tasks!

- What if an onsite microgrid could lighten the process or eliminate steps in the SOP while helping the Emergency Power Source by reducing load **(Take 96hrs for fuel to 150hrs+)**
- What if the healthcare facility could be transferred over to the microgrid before the storm and never loose power

AP Photo / David J. Phillip

Microgrids: A Resiliency Solution

What is a microgrid?

- A **microgrid** is a local electrical grid with defined electrical boundaries, acting as a single and controllable entity. It is able to operate in grid-connected and in island mode. A '**stand-alone microgrid**' or '**isolated microgrid**' only operates off-the-grid and cannot be connected to a wider electric power system.
- A grid-connected microgrid normally operates connected to and synchronous with the traditional wide area synchronous grid (macro grid), but is able to disconnect from the interconnected grid and to function autonomously in "island mode" as technical or economic conditions dictate. In this way, they improve the security of supply within the microgrid cell, and can supply emergency power, changing between island and connected modes. This kind of grids are called '**islandable microgrids'**.
- A stand-alone microgrid has its own sources of electricity, supplemented with an energy storage system. They are used where power transmission and distribution from a major centralized energy source is too far and costly to operate.[1] They offer an option for rural electrification in remote areas and on smaller geographical islands.[4] A stand-alone microgrid can effectively integrate various sources of distributed generation (DG), especially renewable energy sources (RES).

Microgrids & Types

- Microgrids provide hospitals with on-site, clean, resilient power 24/7 attached to the gird and ensures they have the energy they need when the grid goes down
- Typically saves on utility 24/7 and maintenance costs
- Typically operates in parallel with the electric utility, but during a power outage can isolate itself ("island model") from the grid & produce its own power adding business continuity and continued revenue
- Can power a single or multiple buildings
- Typically reduces the environmental footprint (ES&G goals)
- Can be comprised of a variety of technologies, including:
  - Solar
  - Energy Storage / Batteries
  - Fuel Cells
  - Turbines / Microturbines
  - Reciprocating Engines
  - Combined Heat and Power (CHP)
  - Wind

Microgrid Technologies

Solar:

- ✓ Useful for covering peak electricity needs during the day
- ✓ Can supply a small portion of a hospital's power
- ✓ Not capable of Island Mode (No Utility) without batteries
- ✓ Can reduce utility cost
- ✓ Can reduce onsite emissions by at least 10-20%
- ✓ Can be limited by facility space constraints
- ✓ No thermal applications (boiler or other thermal needs)
- ✓ Disposal issues (Hazardous Waste)

Battery Storage:

- ✓ Can help extend solar capacity
- ✓ Overcoming intermittency requires 8x the solar generation and 16x the battery supply
- ✓ Capable of Island Mode (No Utility)
- ✓ Reduce equipment damage by acting as a quality snubber
- ✓ Can reduce utility cost
- ✓ Batteries rely on non-renewable lithium / disposal issues (Hazardous Waste)
- ✓ Can be limited by facility space constraints
- ✓ Cost constraints can prevent a large-scale solution (expensive)

Microgrid Technologies

Fuel Cells

- ✓ Can run continuously to cover up to 100% of electric load
- ✓ Some if sized correctly can provide both electric and thermal
- ✓ Most can not Load follow
- ✓ Most require extra equipment to operate without grid power
- ✓ Very sensitive to grid fluctuations
- ✓ Require electric heaters to start up or maintain temperature during grid outages
- ✓ Can reduce utility cost
- ✓ Some can typically cut a site's scope 1 and 2 emissions by around 20% with 30%
- ✓ Cell stack disposal issues (Hazardous Waste)

Wind

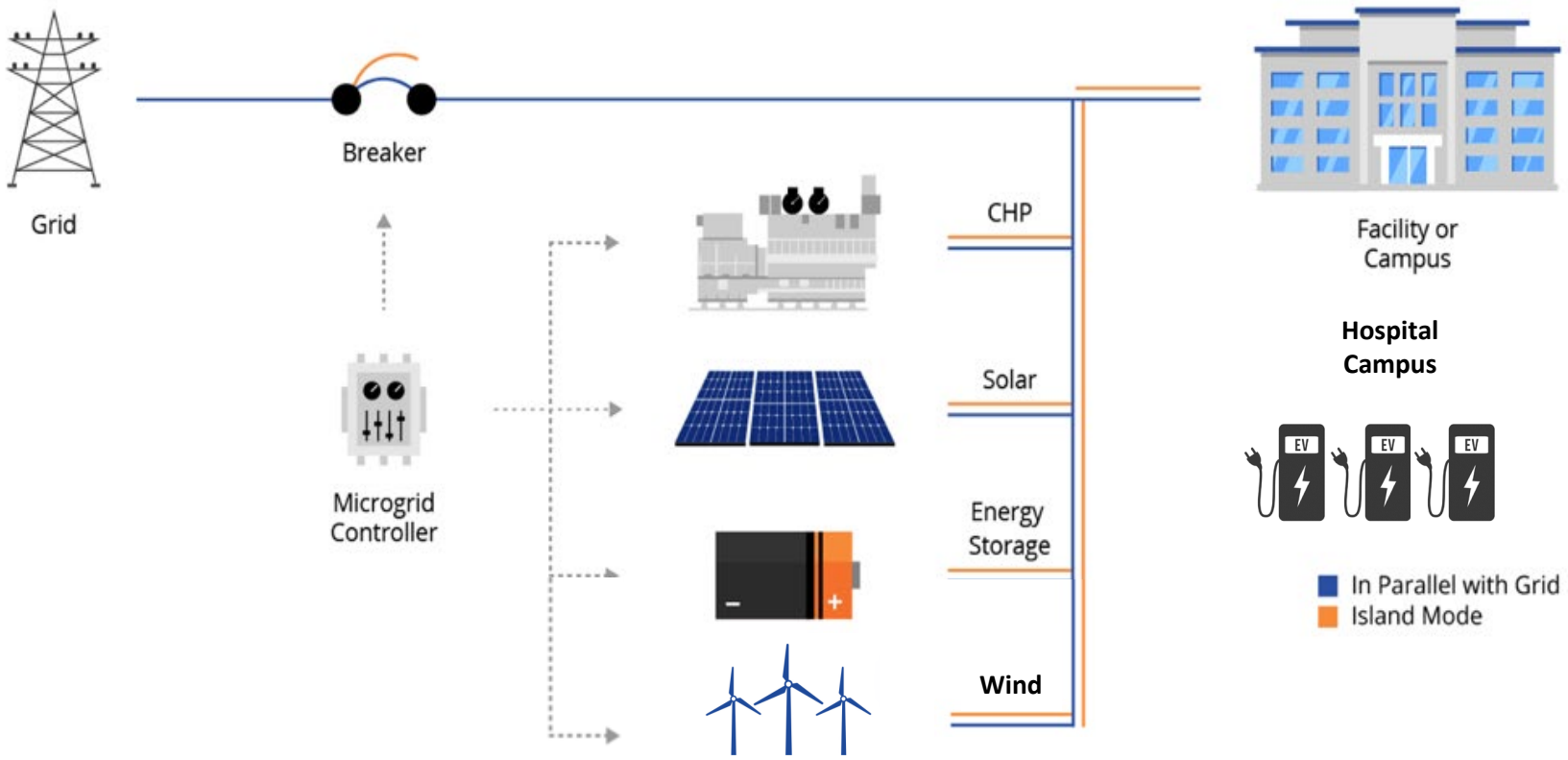
- ✓ Require 12 MPH sustained wind
- ✓ Is limited by facility space and location constraints
- ✓ Capable of Island Mode (No Utility)
- ✓ Can reduce utility cost
- ✓ Can cut a site's scope 1 and 2 emissions when operating
- ✓ Cost constraints can prevent a large-scale solution (expensive)
- ✓ No thermal applications (boiler or other thermal needs)

Microgrid Technologies

Combined Heat and Power ("CHP"):

- ✓ Can run continuously to cover up to 100% of electric load
- ✓ Capable of Island Mode (No Utility)
- ✓ Can include thermal applications (hot water, cold water, steam)
  - ➢ Reciprocating engines for large hot water loads (High Electrical Efficiency) and can load follow
  - ➢ Turbines or microturbines for large steam loads (High Thermal Efficiency) and can load follow
- ✓ Reduces equipment damage by acting as a quality snubber
- ✓ Can reduce utility cost 5% - 20%+
- ✓ Can reduce facility scope 1 and 2 emissions by 25-50+%
- ✓ Can use a variety of fuel sources, including natural gas, hydrogen, or biogas – and can transition from one fuel source to another
- ✓ Can be limited by facility space constraints

Microgrid Technologies, **Take 96hrs to 150hrs+**

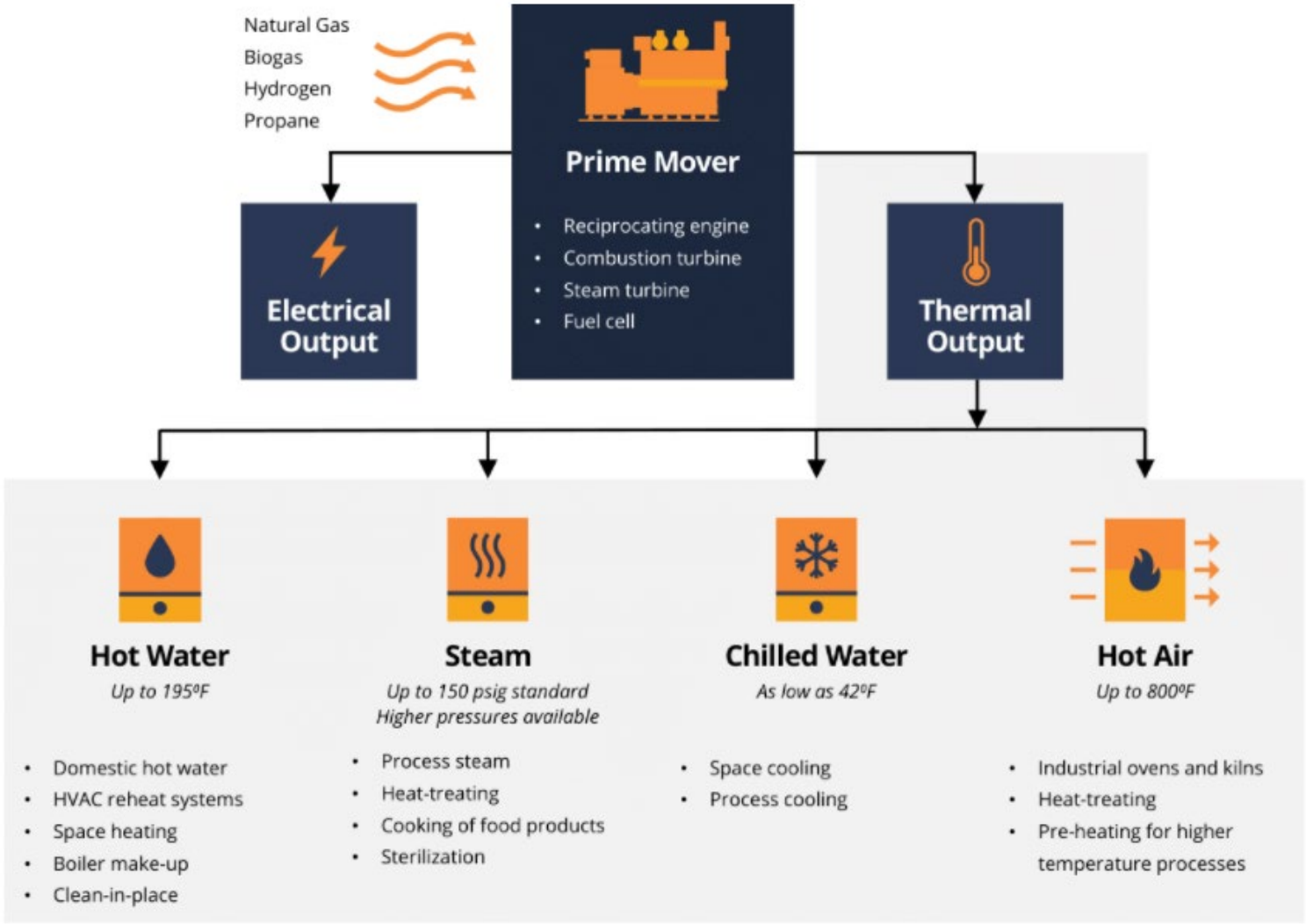


Microgrid solution:

- Microgrid maintenance controller
- H2/Biofuels
- Convertible CHP units
- Solar array
- Battery Storage
- Transportation Electrification

System will normally operate in grid parallel but would shift to island mode during grid outages

CHP Thermal Applications



Business Continuity / Revenue With added Resiliency

What about your important – but not critical – loads?

- ✓ Normal Lighting
- ✓ Food And Drug Preservation
- ✓ Critical Surgeries
- ✓ Non-critical Surgeries
- ✓ Other Revenue Generating Procedures
- ✓ Dr. Appointments / Follow ups
- ✓ Equipment Damage
- ✓ Kitchens
- ✓ Taking On Patients From Other Hospitals
- ✓ Employee Refuge
- ✓ Being A Beacon In The Community For food, Water, Heat Relief, Phone Charging …….

Business Continuity / Revenue With added Resiliency

You avoid in the future:

- ✓ Loss Of Normal Lighting
- ✓ Loss Of Food And Drugs
- ✓ Loss Of Critical Surgeries Revenue
- ✓ Loss Of Non-critical Surgeries Revenue
- ✓ Loss Of Revenue Generating Procedures
- ✓ Loss Of Dr. Appointments / Follow Ups Revenue
- ✓ Loss Of Equipment / Damage
- ✓ Loss Of Kitchens
- ✓ Loss Of Employee Refuge and Relief Services
- ✓ Taking Patients To Other Hospitals
- ✓ Loss Of Community Outreach
- ✓ Multiple Fuel Deliveries
- ✓ **Take 96hrs to 150hrs+**

How to Pay for It?

- **Private financing**

- **US / State / FEMA / Utility Incentives**:
  - IRA Business Energy Investment Tax Credit (ITC) 30-40%
  - 501C Inflation Reduction Act (IRA) of 2022 (P.L. 117-169, IRA) gives tax-exempt entities equal access to clean energy incentives by introducing the direct pay
  - Solar and CHP Sales Tax Exemption
  - Net Metering
  - Plug-In Electric Drive Vehicle Tax Credit
  - FEMA Grants/Funding & Others

- **Energy as a Service (EaaS) model:** partnering with a third party, using a 15-25 year Energy Services Agreement (ESA) ZERO out of pocket and off balance sheet
  - Inflation Reduction Act (IRA) Business Energy Investment Tax Credit (ITC) 30-40% included
  - 501C Inflation Reduction Act (IRA) of 2022 (P.L. 117-169, IRA) gives tax-exempt entities equal access to clean energy incentives by introducing the direct pay
  - Third party can use incentives / funds or sell them if no tax appetite

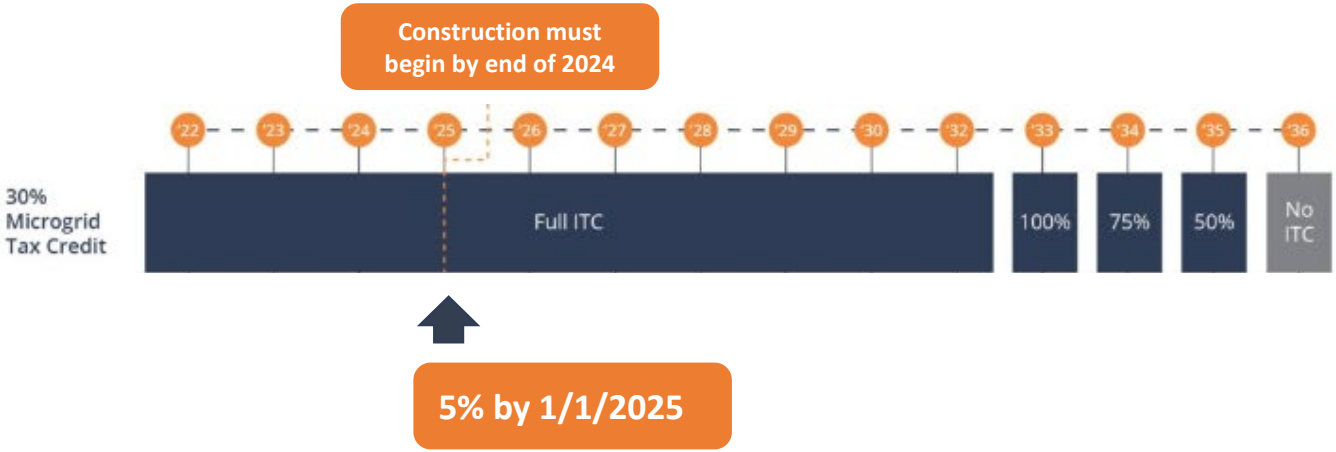
The Time is to Act is Now: The Inflation Reduction Act

The passage of the Inflation Reduction Act offers $369 billion in funding that will change how industries buy, generate and store energy, with the goal of reducing Greenhouse Gas (GHG) emissions by 40% by 2030.

IRA Total Potential Tax Credit Value

Base Microgrid Credit Value *CHP, Solar, BESS, Wind, Fuel Cell*		Energy Community		Domestic Content		Low-Income Bonus Credit *		
30%	+	10%	+	10%	+	10% or 20%	=	Up to 70%

Timeline for 30% Microgrid Tax Credit

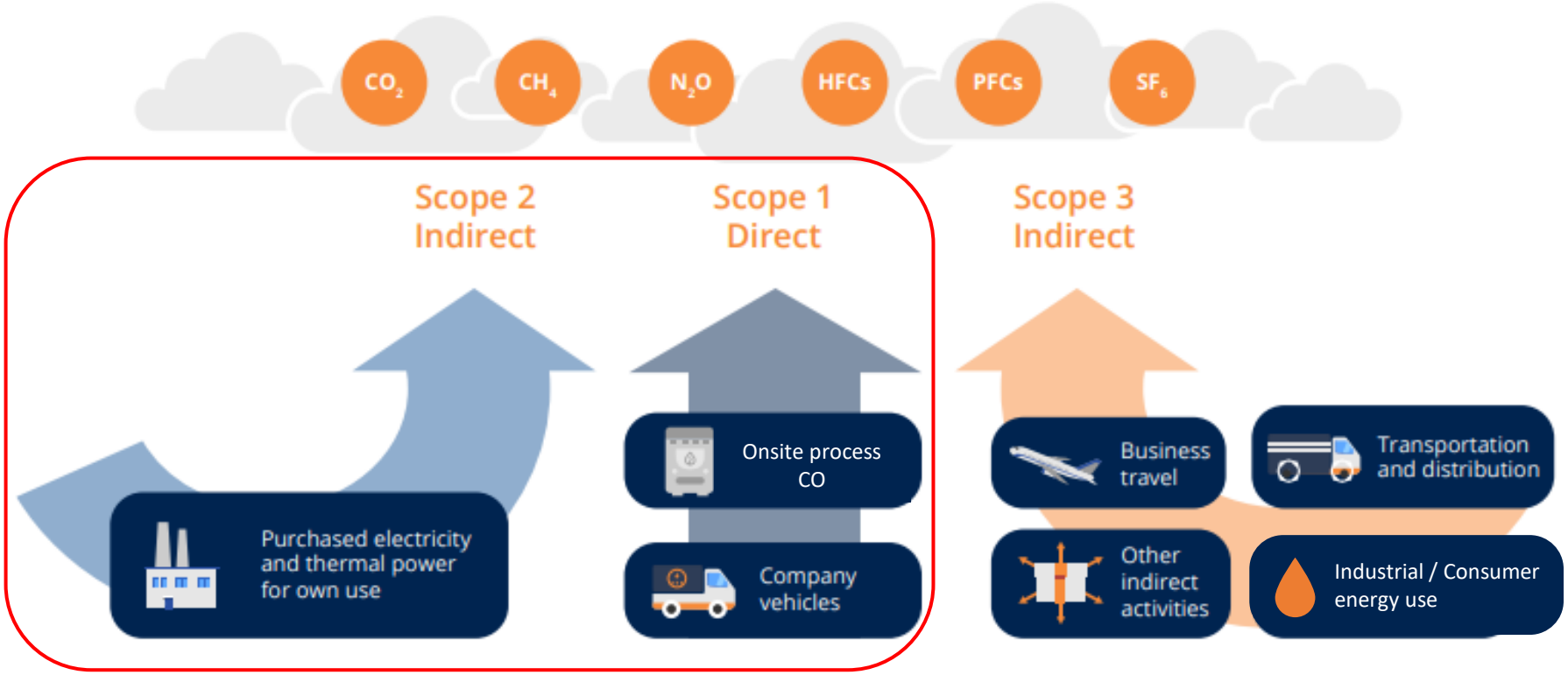


FEMA Grant Funding

- ✓ Hazard Mitigation Grant Program (HMGP)
- ✓ Flood Mitigation Assistance (FMA)
- ✓ Building Resilient Infrastructure and Communities (BRIC)
- ✓ Pre-Disaster Mitigation (PDM) Grant Program
- ✓ Resilience Grants
- ✓ Safeguarding Tomorrow RLF Program
- ✓ Preparedness Grants
- ✓ Resilience Grants
- ✓ Continuing Training Grants Program
- ✓ Emergency Food and Shelter Program
- ✓ Shelter and Services Program

Carbon Footprint: Microgrids Address Scope 1 & 2 Emissions

- ✓ Hospitals must address carbon intensity as part of their operations, utility, and supply chain to increase the value of their operations
- ✓ Efficient electrical and thermal use of microgrids reduces Scope 1 & 2 emissions
- ✓ New SEC requirements may require detailed assessments of GHG emissions; VPPAs pose a risk in the future



Framework for sustainability initiatives

1 Reduce usage - Energy Efficiency initiatives

- LED lighting
- VFDs
- Boiler upgrades
- BMS optimization
- Process initiatives
- Electrification

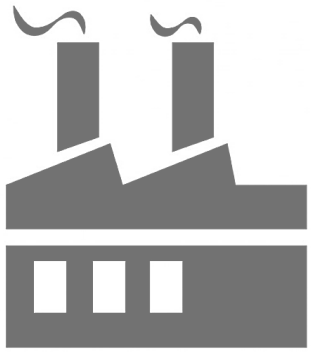
Challenge: impact is small relative to entire load – electrification difficult for process heating

2 Decarbonize fuel supply

Electricity
- Renewables – solar + battery

Process Heat
- Combined Heat and Power
- Hydrogen
- Biofuels

Challenges: Renewables take significant space and only address electric; Hydrogen and Biofuels are not readily available



3 Capture carbon after process

Carbon capture:
- Exhaust stacks
- Combined Heat and Power

Sequestration via pipeline or rail

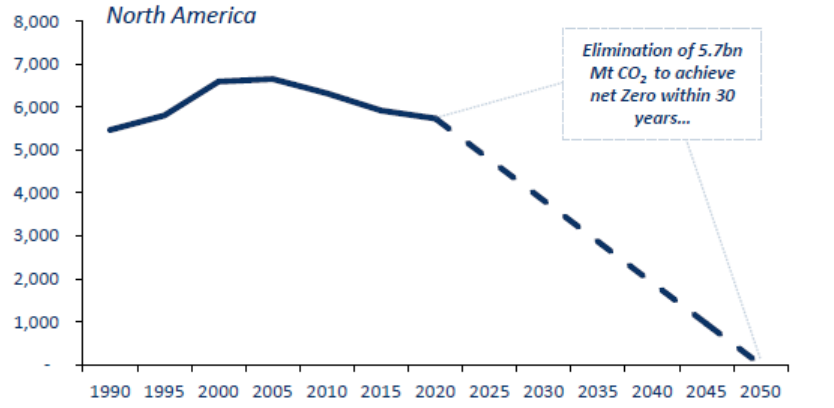
Carbon Capture Utilization in manufacturing processes

Challenges: Need to use in process or access to carbon capture facility via pipeline or rail

Sustainability initiatives fall into 3 categories

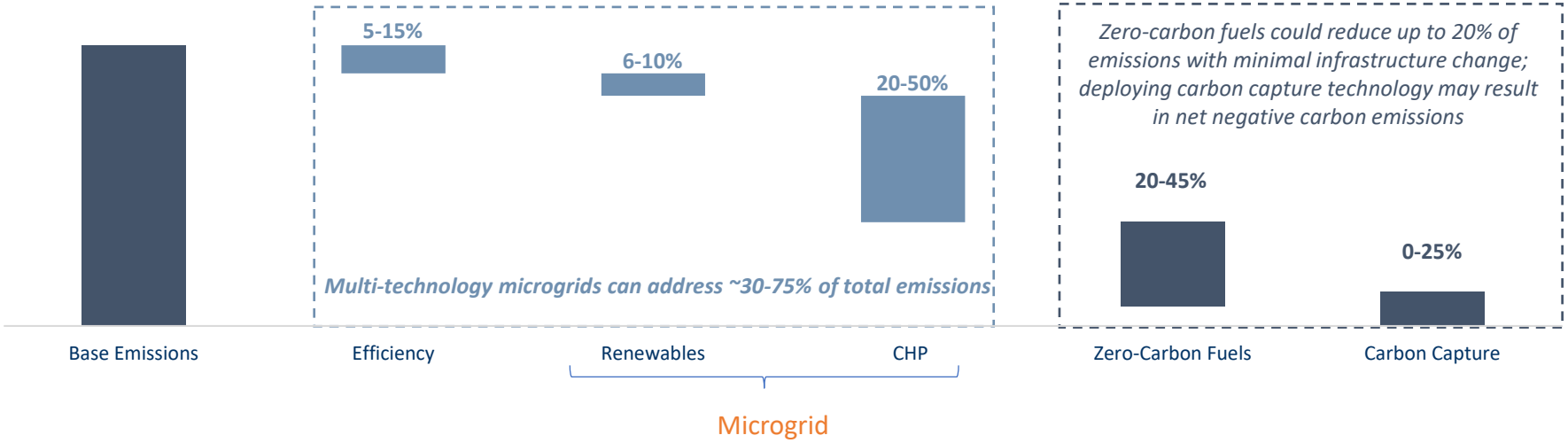
Carbon neutral pathway

The Path to Net Zero Requires Swift Action



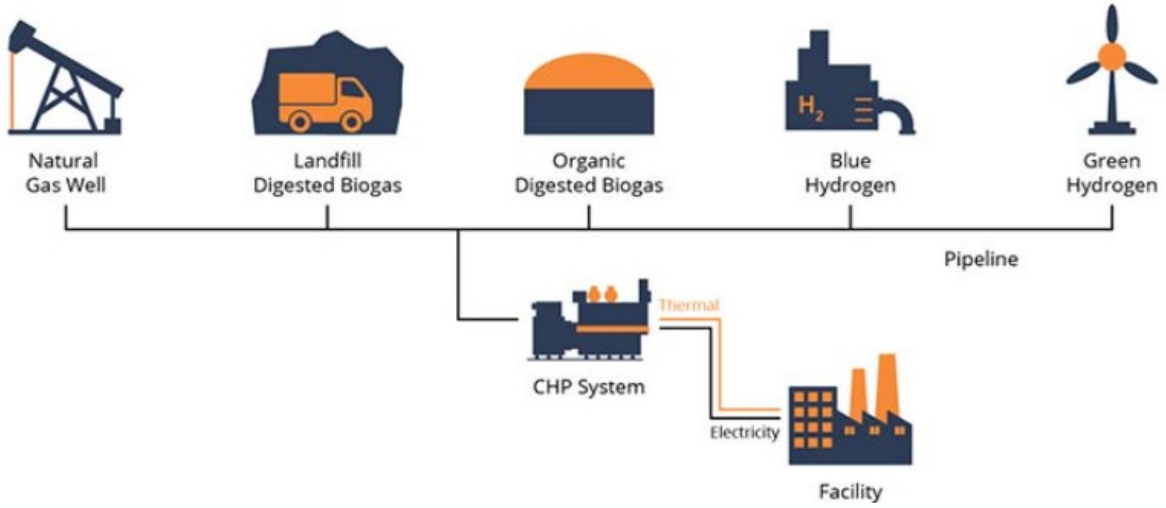
- ✓ Multiple technology microgrids can reduce carbon emissions from 30 to 75%
- ✓ Cogeneration alone can reduce carbon emissions by 20 to 50%.
- ✓ Zero carbon fuels, if available, can reduce carbon emissions by 20-45%, but can only represent up to 20% of pipeline gas with little infrastructure change
- ✓ CCS technologies on the industrial process and onsite combustion exhaust (boilers & CHP) can reduce carbon emissions between 50-95%

Energy Transition Potential with Microgrids



Renewable Fuels

Microgrids can be designed to transition to biogas and hydrogen and these fuels become economically feasible and available.



Natural gas

- Widely available
- Inexpensive
- Lower carbon intensity than other fossil fuels

Renewable gas

- Created from organic waste
- Injected into the pipeline
- Proven technology
- Limited capacity in the US

Hydrogen

- Currently used in industrial processes
- Emerging technology
- Potential to inject ~15% of pipeline

Microgrid Benefits

1 Business Continuity with Expandability

- Operate normally in grid parallel but shift to island mode during a grid outage and can operate facility at full scale
- Improves power quality
- Microgrids provide business continuity and energy supply chain certainty
- Ability for additional power as the sites electrical intensity grows

2 Savings

- Typically save 5-20% on total energy bill, including gas and electric
- 2022 IRA provides 30-40% ITC on most DG technologies increasing savings potential.
- CO2 reduction via low carbon fuels and CCS + 45Q have potential to drive customer top line

3 Sustainability

- Reduce carbon footprint by an average of 20-50%+ per year depending on facility location and thermal load
- Path to facility becoming carbon neutral
- Carbon Intensity scores can be significantly lowered utilizing CHP + CCS + low carbon fuels

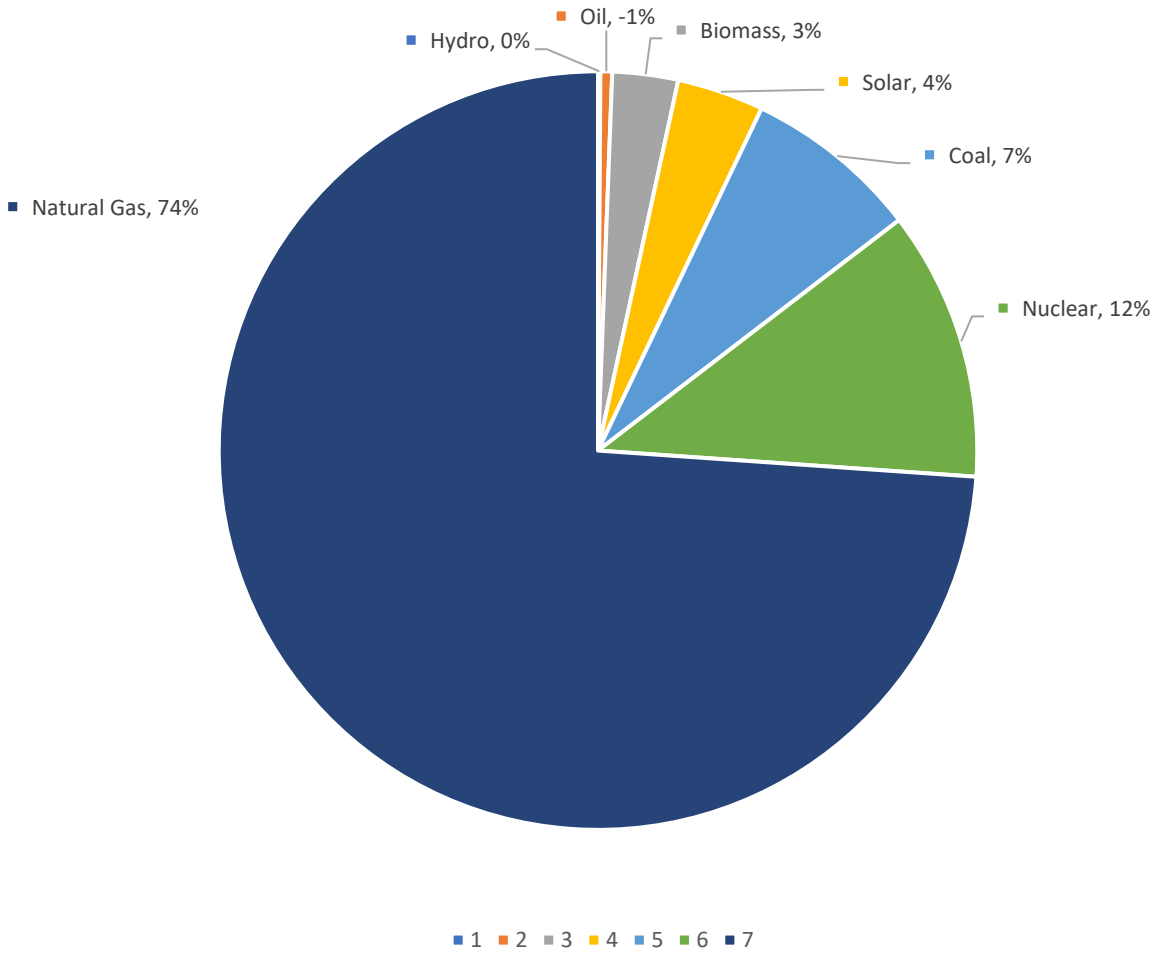
4 EaaS Model

- Outsource technology risk
- Pay based on energy usage, with no initial capital investment
- 3rd Party pays for engineering, construction, and ongoing maintenance & operations
- Central Plant upgrades & fleet electrification can be included in contract pricing

Microgrids vs. Added Diesel Backup

	Backup Generator	Microgrid with ESA Model
Upfront Costs (CapEx)	**$300,000 per MW** ✓ Paid by facility ✓ Installation cost similar to CHP	**$0** ✓ All capital costs are included in ESA
Operating Costs (OpEx)	**$20k-100k annually** ✓ Service contracts with a service provider ✓ Periodic fuel replacement	**$0** ✓ All O&M costs are included in an ESA ✓ Saves money over time vs local utility
Operating Profile	✓ Runs during power outages and 30 minutes per week for testing ✓ Does not supply thermal loads	✓ Runs 24/7/365 in parallel with your local utility powering all electrical and thermal loads
Fuel	✓ Diesel stored on-site	✓ Natural gas, RNG from underground pipeline
Resiliency	✓ Starts quickly ✓ Requires frequent fuel deliveries during long outages ✓ Best for short (<24 hour) outages ✓ Life Safety Certified	✓ Best for short and long, multi-day outages ✓ Several-minute ramp up time ✓ No refueling required due to uninterruptible and infinite gas supply in the pipeline
Permitting	✓ Customer required to file and update annually	✓ Included in ESA

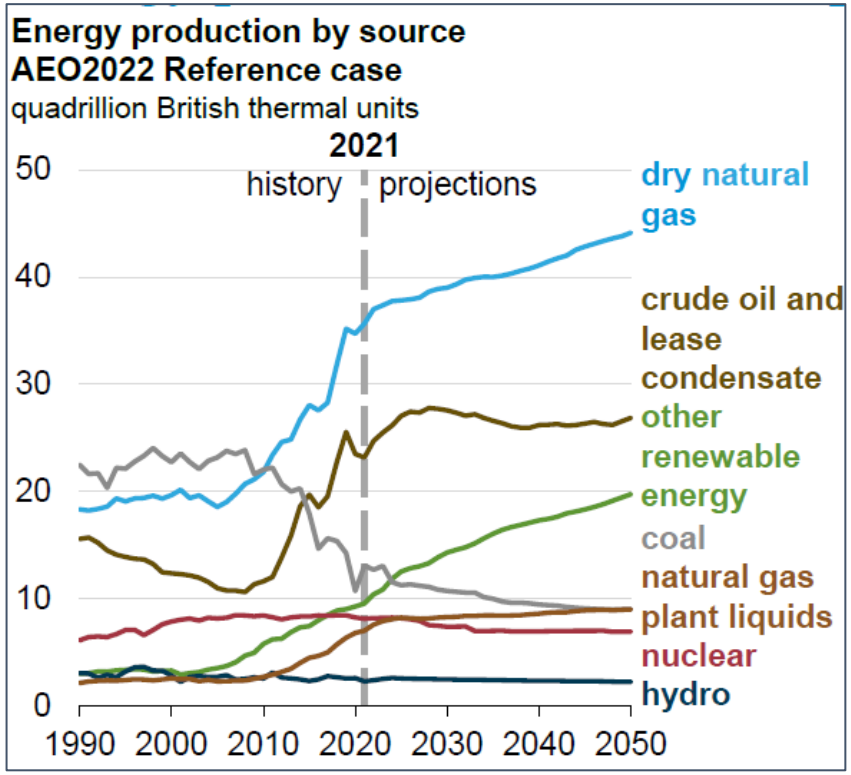
Florida Power By Fuel Today

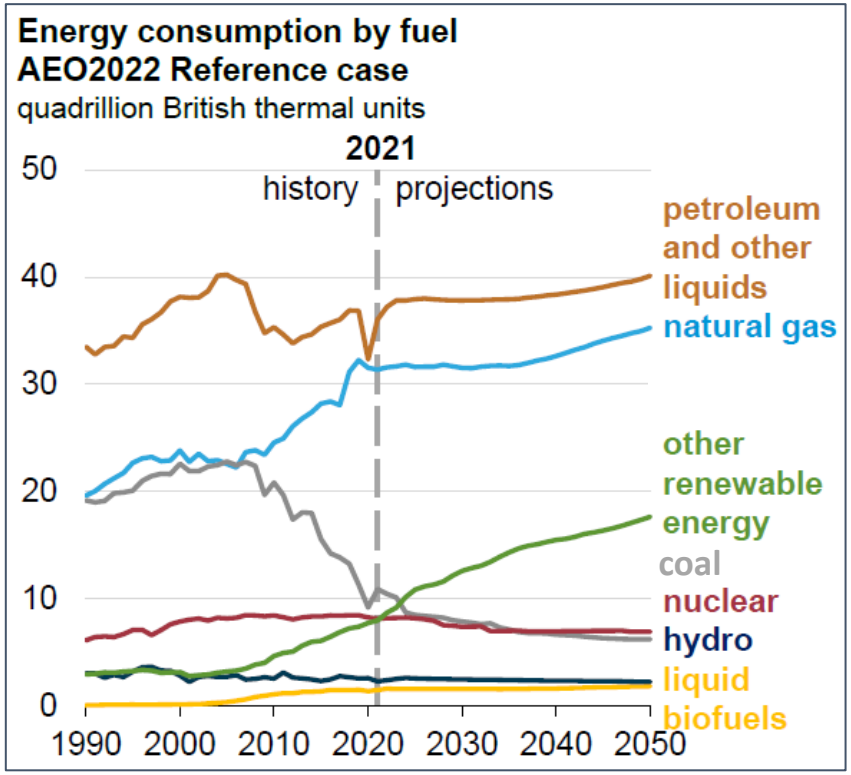


[1] Source: U.S. Energy Information Administration EIA HOURLY ELECTRIC GRID MONITOR

Natural Gas will remain a prominent fuel source[1]

- ✓ Natural Gas will remain a prominent fuel source enabling the energy transition
- ✓ Coal produced energy will continue to decline
- ✓ Renewable-generated energy production will continue to increase, but rely on natural gas for firming capacity
- ✓ 30% of emissions are from transportation - EV adoption will neutralize petroleum consumption growth





[1] Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022 (AEO2022)*

Microgrids: A Resiliency Solution for Hospitals, **Take 96hrs to 150hrs+**

Onsite microgrids support the transition to Zero Carbon, enabling hospitals to take control of their energy future:

1. Resiliency, Expansion, and Power Quality:

Ensure resiliency even during utility outages and brownouts, while improving power quality with the ability to **expand quickly** as site energy intensity grows

2. Savings / Supply Chain Certainty:

Ensure resiliency to allow for production even during utility outages and brownouts, while improving power quality

3. Sustainability:

Meet evolving ESG and sustainability commitments of corporate leadership

4. EaaS Model:

Third party commits capital to upgrade central plant (boilers, chillers) allowing hospital to focus capital on patient care

- ✓ Onsite cogeneration provides reliable, cost-effective electricity and can operate in island mode to provide power to the hospital when the utility is down
- ✓ Using the waste heat to offset boiler usage improves efficiency and reduces the carbon footprint of the hospital
- ✓ Adding in solar and BESS where possible, including in parking lots, increases renewable energy
- ✓ Including EV charging stations for doctors and patients supports the energy transition

Thank you!

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