

# High-Temperature Solid Oxide Electrolysis Stack Manufacturing

U.S. Department of Energy High-  
Temperature Electrolysis (HTE)  
Manufacturing Workshop

March 8, 2022



# Safe Harbor Statement

This presentation contains forward-looking statements within the meaning of the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 regarding future events or our future financial performance that involve certain contingencies and uncertainties, including those discussed in our Annual Report on Form 10-K for the fiscal year ended October 31, 2021 in the section entitled "Management's Discussion and Analysis of Financial Condition and Results of Operations". Forward-looking statements include, without limitation, statements with respect to the Company's anticipated financial results and statements regarding the Company's plans and expectations regarding the continuing development, commercialization and financing of its fuel cell technology and its business plans and strategies. These statements are not guarantees of future performance, and all forward-looking statements are subject to risks and uncertainties that could cause actual results to differ materially from those projected. Factors that could cause such a difference include, without limitation: general risks associated with product development and manufacturing; general economic conditions; changes in interest rates, which may impact project financing; supply chain disruptions; changes in the utility regulatory environment; changes in the utility industry and the markets for distributed generation, distributed hydrogen, and fuel cell power plants configured for carbon capture or carbon separation; potential volatility of commodity and energy prices that may adversely affect our projects; availability of government subsidies and economic incentives for alternative energy technologies; our ability to remain in compliance with U.S. federal and state and foreign government laws and regulations and the listing rules of The Nasdaq Stock Market; rapid technological change; competition; the risk that our bid awards will not convert to contracts or that our contracts will not convert to revenue; market acceptance of our products; changes in accounting policies or practices adopted voluntarily or as required by accounting principles generally accepted in the United States; factors affecting our liquidity position and financial condition; government appropriations; the ability of the government and third parties to terminate their development contracts at any time; the ability of the government to exercise "march-in" rights with respect to certain of our patents; our ability to successfully market and sell our products internationally; our ability to implement our strategy; our ability to reduce our levelized cost of energy and our cost reduction strategy generally; our ability to protect our intellectual property; litigation and other proceedings; the risk that commercialization of our products will not occur when anticipated or, if it does, that we will not have adequate capacity to satisfy demand; our need for and the availability of additional financing; our ability to generate positive cash flow from operations; our ability to service our long-term debt; our ability to increase the output and longevity of our platforms and to meet the performance requirements of our contracts; our ability to expand our customer base and maintain relationships with our largest customers and strategic business allies; changes by the U.S. Small Business Administration or other governmental authorities to, or with respect to the implementation or interpretation of, the Coronavirus Aid, Relief, and Economic Security Act, the Paycheck Protection Program or related administrative matters; and concerns with, threats of, or the consequences of, pandemics, contagious diseases or health epidemics, including the novel coronavirus, and resulting supply chain disruptions, shifts in clean energy demand, impacts to our customers' capital budgets and investment plans, impacts to our project schedules, impacts to our ability to service existing projects, and impacts on the demand for our products, as well as other risks set forth in the Company's filings with the Securities and Exchange Commission. The forward-looking statements contained herein speak only as of the date of this presentation. The Company expressly disclaims any obligation or undertaking to release publicly any updates or revisions to any such statement contained or incorporated by reference herein to reflect any change in the Company's expectations or any change in events, conditions or circumstances on which any such statement is based.

The information set forth in this presentation is qualified by reference to, and should be read in conjunction with, our Annual Report on Form 10-K for the fiscal year ended October 31, 2021, filed with the SEC on December 29, 2021, our Form 10-Q for the three months ended January 31, 2022, filed with the SEC on March 10, 2022, and our earnings release for the first fiscal quarter of 2022, filed as an exhibit to our Current Report on Form 8-K filed with the SEC on March 10, 2021.

# FuelCell Energy: A Global Leader in Fuel Cell Technology – Operating Since 1969

## COMPANY OVERVIEW

A global leader in **decarbonizing power** and **producing hydrogen** through our proprietary fuel cell technology

FuelCell Energy is working to:

- **Produce** low- to zero-carbon power
- **Capture** carbon and greenhouse gasses while simultaneously generating power; Negligible NOx or SOx emissions
- **Supply** green or blue hydrogen power
- **Store** energy from intermittent renewables by converting excess power to hydrogen – then converting hydrogen back into power when it's needed or delivering to other applications

## COMPANY HIGHLIGHTS<sup>1</sup>

**HQ** Danbury, Connecticut

**~400** Employees

**95** Platforms in Commercial Operation  
**3** Continents

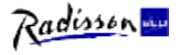
**FCEL** Listing: NASDAQ

**>225 MW** Capacity in Field

**>12** Million MWh's generated with SureSource Patented Technology

<sup>1</sup> As of the quarter ended January 31, 2022

## GLOBAL CUSTOMERS



**Demand for Clean, Reliable Electricity Driving Adoption of Fuel Cell Technology**



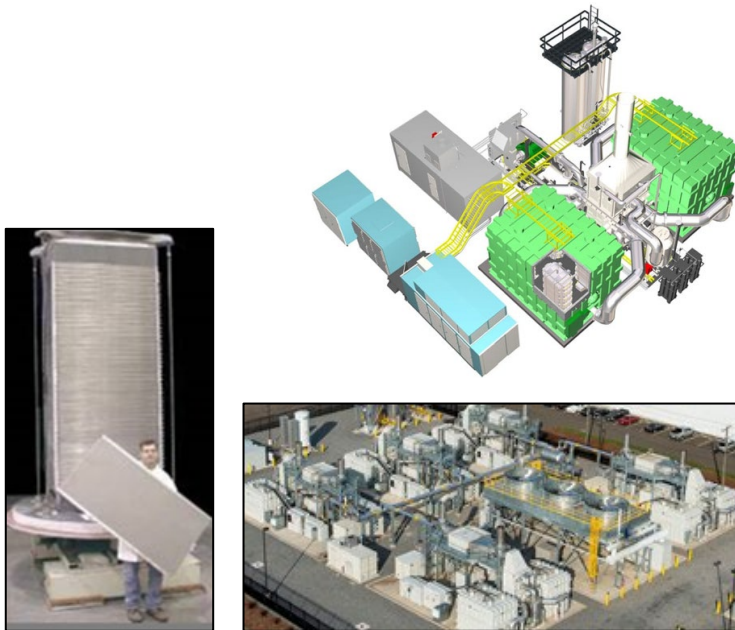
# Technology Overview

## High Temperature Fuel Cell and Electrolysis Solutions

- Fuel cells cleanly and efficiently convert energy in hydrogen rich fuels into electricity and high-quality heat
- A fuel cell stack is comprised of many individual cells grouped together. Stack modules can have one or more stacks
- Fuels are converted to hydrogen in the stack by reforming using water and heat produced by the fuel cells
- Hydrogen not used in power generation can be exported to hydrogen users
- Fuel cell stacks can also operate in electrolysis mode – producing hydrogen from steam and power

## Carbonate

- Large stacks provide economies of scale in MW-scale power generation applications
- Uniquely suited to operate with on-site renewable biogas
- Produces hydrogen through internal reforming or electrolysis/reforming combination



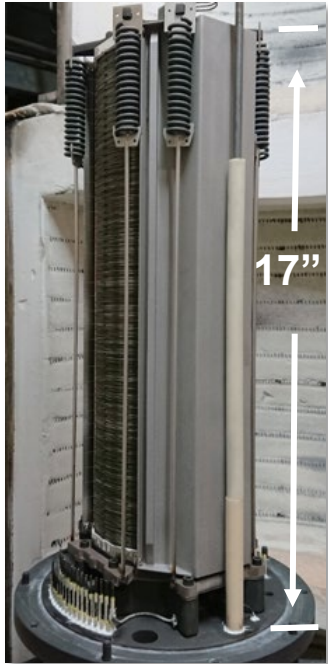
## Solid Oxide

- Compact, lightweight and scalable stack design
- Can operate with natural gas, biogas, or hydrogen fuel
- Can produce hydrogen through internal reforming or electrolysis
- Can alternate between fuel cell and electrolysis modes in hydrogen-based energy storage systems

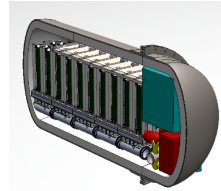
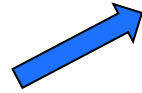


# Solid Oxide Applications

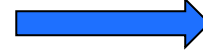
## SOFC Stack



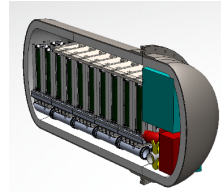
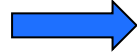
7 kW DC Power Generation  
36 kW DC / 25 kg H<sub>2</sub>/day electrolysis  
350 cells, 17" height



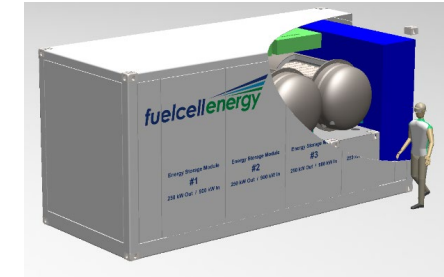
**Power Generation Stack Module** – Only runs in power generation mode on a wide range of fuels, including natural gas, biofuels, propane, and hydrogen



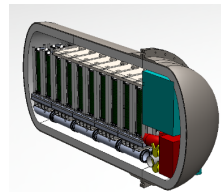
**200kW Power Generation System**



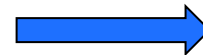
**Electrolysis Stack Module** – Produces hydrogen from steam with power input



**Electrolysis**  
4,000 kg/day H<sub>2</sub> from 7.3 MW



**Energy Storage Stack Module** – Alternates between power generation on hydrogen fuel and electrolysis producing hydrogen from water



**Energy Storage System**  
1MW 8 MWh

# FuelCell Energy North American Operations



## Headquarters Danbury, CT

- Corporate Headquarters
- Research labs
- Engineering design
- Global Service center



## Manufacturing Torrington, CT

- Module Assembly & Stacking
- 167,000 sq. ft.



## Solid Oxide Development & Manufacturing Calgary, AB, Canada

- 32,000 sq. ft.
- Research labs
- Cell and stack production
- Cell and stack testing



# Carbonate Manufacturing

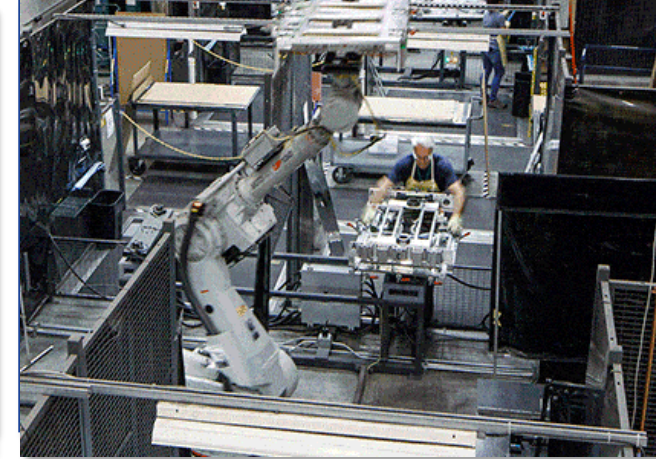
Tape Casting: Anode & Matrix



Sintering: Cathode



Sheet Metal: Bi-Polar Plate



Sub-Assembly  
Cell Package Unitization



Final Assembly  
Stacking & Module Assembly



# Solid Oxide Manufacturing





# Leveraging Carbonate Manufacturing Experience as we Build Out Solid Oxide Manufacturing Capacity

- Common processes and manufacturing methods
- Common supply chain elements
- Unique Solid Oxide processes well developed from Calgary experience base
- Expanding Calgary capacity and exploring further expansion elsewhere

# Thank You