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# The Hydrogen Economy & Capstone Green Energy

Don Ayers  
Vice President, Technology

**Smarter Energy  
for a Cleaner Future**

# Leadership Team: Don Ayers

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**Don Ayers**

Vice President, Technology

**Mr. Ayers** has been serving Capstone Green Energy in technical roles since 2014.

Prior to joining Capstone, he held program and project manager positions at L-3 Communications, Technicolor and Kavlico.

He holds a Masters in Business Administration from Pepperdine Graziadio Business School and a Bachelors in Mechanical Engineering from Purdue University, with a focus on gas turbine technology.

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# Technology for Multiple Markets

## Energy Efficiency

Generate on-site power and capture thermal energy from the exhaust in CHP and CCHP applications for **Hotels, Large Residential Complexes, Retail Buildings and Office Buildings.**

## Microgrids

Provide reliable, resilient on-site power through a dual-mode microturbine or in conjunction with other distributed energy resources that can operate independently of the utility grid to balance loads and generation.

## EV Charging

Using renewable energy to power the EV charging infrastructure eliminates strain on the grid and the environment, especially when paired with smart **EV charging** solutions.

## Oil, Gas and Other Natural Resources

Produce on-site power for all phases of O&G production in both onshore & offshore applications for **Drilling Operations, Flare Gas Reduction, Gas Compression, Mining & Water Conversion.**

## Renewable Energy

Cleanly and efficiently generate on-site power from biogas and other waste products to create high-efficiency renewable power and heat for **Farm Digesters, Landfills, Food Waste and Solid Waste Management.**

## Critical Power Supply

Mission-critical businesses have an uninterruptible power source with the world's only microturbine-powered UPS solution for **Data Centers, Hospitals, Telecom and Power Rentals.**

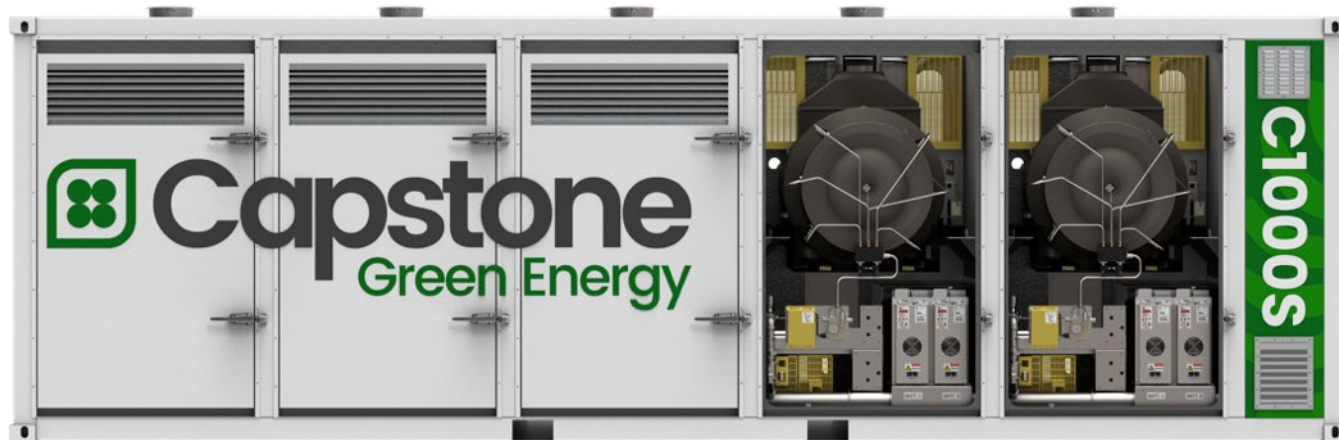


# Hydrogen – What / When / Why

- The push to a hydrogen economy has accelerated over the past 2 years.
- Hydrogen is positioned for meaningful growth within the framework of the DOE's Hydrogen Shot™
  - The ambitious goal announced in summer 2021 seeks to reduce the cost of clean hydrogen to \$1 per 1 kilogram in 1 decade
- Passage of the Building Infrastructure Law and Inflation Reduction Act in support of the Hydrogen Shot provides the pathway to demonstrating and building the hydrogen economy.
- As hydrogen becomes more widely available, and costs come down, deployed energy systems must have flexibility to use hydrogen as a fuel.
- The real value for our customers sits in the broader context of fuel flexibility and providing a customer with options now, before the hydrogen economy becomes reality.

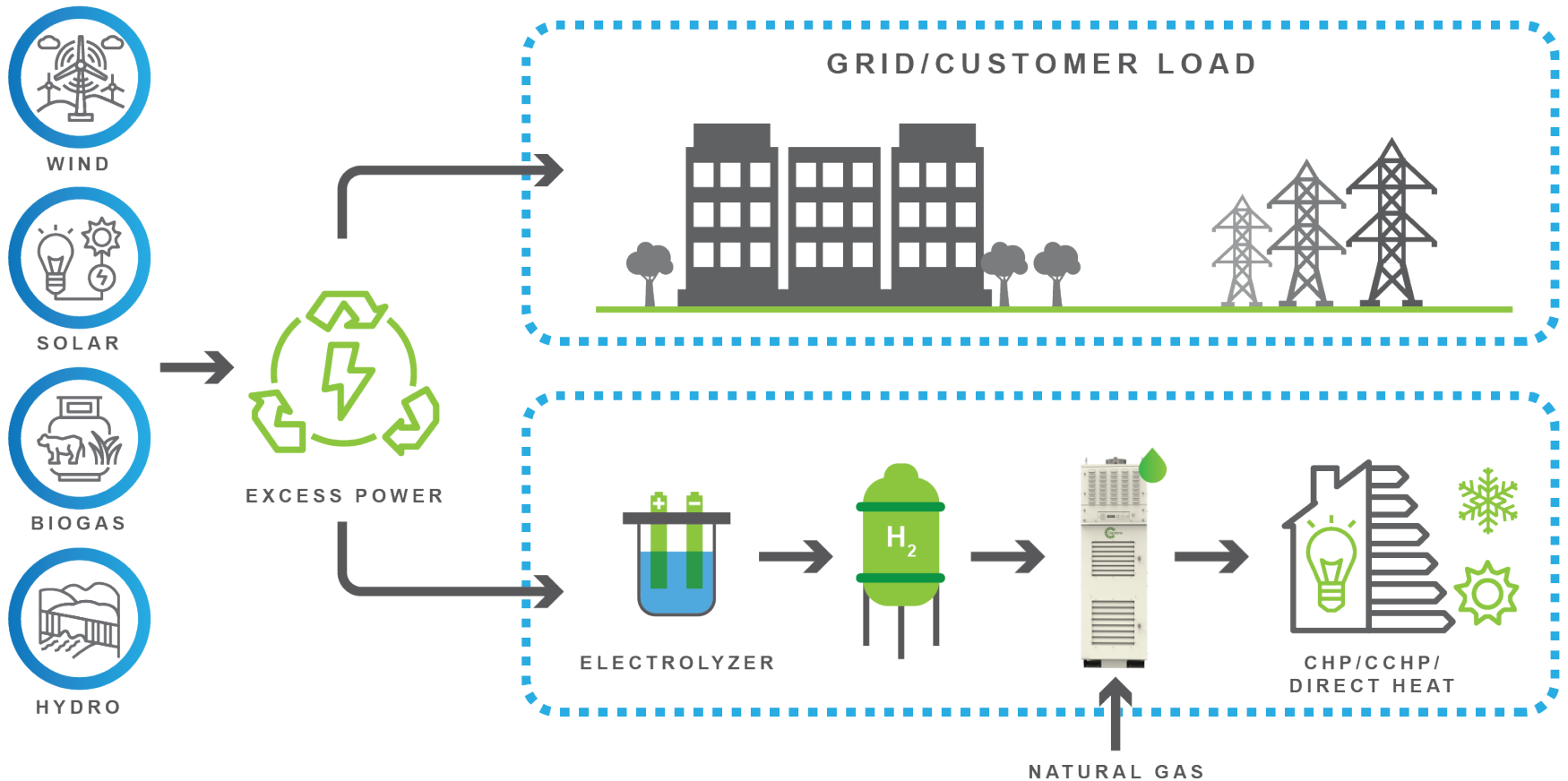


# Hydrogen – Key Topics



- Capstone’s flexible core engine and sophisticated controls technology is the perfect platform for development into new markets, applications, and fuels
- Hydrogen brings several challenges to turbomachinery in gas compression, storage, transmission, combustion, and associated safety controls
- Hydrogen and natural gas blends will provide the transition fuel for industry to achieve intermediate carbon emission goals, until such time as other technologies become hydrogen ready
- Capstone’s fuel technology roadmap planned measured progress towards understanding existing capabilities with hydrogen while forwarding product development in more aggressive fuels

# Hydrogen System Architecture



# Capstone's Hydrogen Strategy

- Background and Strategy Overview
  - 17 years of measured progress towards a combustion safe hydrogen injector
  - Patent issued in 2019
  - Work on hydrogen and natural gas blends as a transition fuel for industry to achieve immediate carbon emission reductions
  - Implement patented injectors to ensure product and performance reliability
  - Develop commercial product as standards and certifications solidify
- Hydrogen Fuel Blending
  - March 2022 - Capstone announced up to 30% hydrogen to natural gas blending using existing products
- 100% Hydrogen Operation - Dual Path Program
  1. Work with National Lab and Academic partners to demonstrate combustion performance digitally and physically
  2. Establish pilot sites with key distributors in high growth hydrogen areas, especially in the development of micro-grids

Total **savings** over the last **four years** are estimated at:



**1.5M Tons**  
OF CARBON  
SAVINGS



**\$911M**  
IN FINANCIAL  
SAVINGS



**10,000**  
MICROTURBINES  
SHIPPED

# Hydrogen Funding

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- Funding opportunities have taken longer than expected to develop
- Gained traction with passage of BIL, and now with state and local entities leveraging off the guidance of the Hydrogen Shot™ initiative
- The IRA plays a significant role in providing CHP cost savings to customers now while achieving their long term decarbonization goals
- U.S. Department of Energy (DOE)
  - Hydrogen Hubs: ARCHES – California’s consolidated approach to being chosen as 1 of the 4 hydrogen hubs
  - HPC4EI – Argonne’s high performance computing network for CFD and combustion analysis
  - Support IEDO and FECM decarbonization roadmaps with Capstone’s extensive experience in industrial applications with waste heat needs
- California Energy Commission
  - HYBLOX – Hydrogen Blending and Lower Oxides of Nitrogen
- Local Utilities
  - RD&D funds for demonstration of hydrogen operating power generation





# Hydrogen – Key Takeaways

- Microturbines are an economically viable, highly reliable, and low emission technology providing immediate electrical and thermal energy to many customers around the world, in thousands of applications
- Initial interest has been from sites producing hydrogen as a byproduct, regions with blended hydrogen/natural gas, and in projects co-located with hydrogen generation capability
- Capstone will leverage relationships with technology partners, along with industry leaders, to enable accelerated product development, in the most cost effective and results driven manner





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in your hands.**

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**Thank you**

**NASDAQ: CGRN**