

# Sustainable Business Opportunity: CCS for Existing Fossil Fuel Fired Power Stations & Industrial Facilities

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## Jupiter Oxygen Corporation

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# Who We Are

- *A privately held company in Chicago with a patented innovative technology to capture CO<sub>2</sub> emissions from fossil fuel power generating plants and industrial facilities.*
- *An environmental technology and project development company.*
- *Poised for large scale Carbon Capture and Storage (CCS) application in the power and industrial sectors with our High Flame Temperature Oxy-Combustion Carbon Capture.*



# The Market

## Race to Net-Zero



*A fundamental energy transition, driven by global population growth and the accompanying energy demand for fossil fuel based generation.*

*Fossil fuel demand is projected to peak in the next two decades due to renewable's inability to meet demand.*

### **Carbon Capture & Storage**

*The MOST attractive transitional technology to decarbonize the electric generation fleet and industrial facilities to achieve Net-Zero.*

**SUSTAINABLE • RELIABLE • LOW COST**

# Market Focus

*Providing CCS based technological solutions to address Greenhouse Gas emissions and Climate Change for:*

***Power Plants***

***Combined Heat and Power***

***Industrial Facilities***

*CCS supports rising demand for energy and climate mitigation targets*

***CCS market Size ~\$4 Trillion by 2050  
(Exxon Mobil)***



# ESG Considerations



- *Carbon footprint reduction, a race toward Net-zero*
- *Energy efficiency improvement*
- *Establish business ethics*
- *Improved community impact*

*UN Intergovernmental Panel on Climate Change recognizes carbon capture technologies as a critical element to achieving global climate justice and mitigation.*

# Why JOC Should Be On Fossil-Fired Generators Radar

- *JOC's near-zero emissions technology is ready for full scale demonstration at an existing facility.*
  - *Completed a FEED study in 2021 for a CCS project for a major electric utility.*
  - *Oxy-combustion based carbon capture is more cost effective than amine-based post-combustion for units  $\leq 400$  MW.*
- *With the recent enactment of the Infrastructure Investment and Jobs Act, the U.S. DOE will invest \$10 billion for CCS.*
- *CCS is integral in achieving Net-Zero by 2050.*



# Jupiter Oxygen' Patented Solution

*High Flame Temperature Oxy-Fuel  
Combustion Carbon Capture*

*Retrofit Technology for Existing Facilities*

*97+% Carbon Capture Rate*



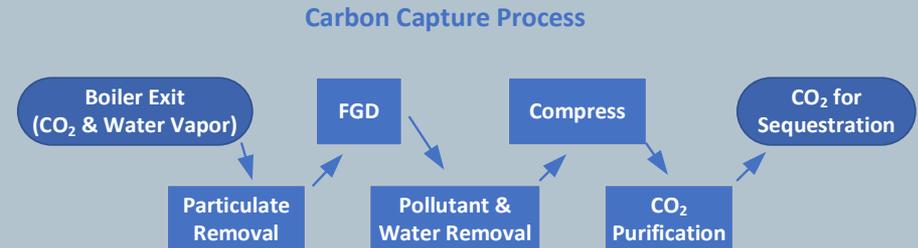
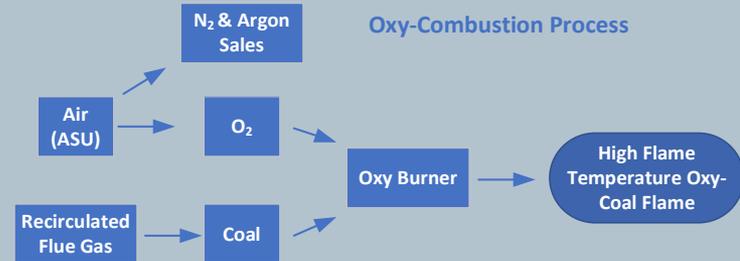
# Our Technology

## Oxy-Combustion

- *Combust with oxygen instead of air*
- *Elimination of nitrogen for easier CO<sub>2</sub> capture with minimal NO<sub>x</sub>*

## Oxy-Combustion Carbon Capture

- *97+% CO<sub>2</sub> capture rate*
- *Near-zero emissions*
- *No NO<sub>x</sub> controls required to achieve less than NSPS/BACT levels of 0.05 lb/MMBtu*
- *Water recovery from process for reuse*
- *Low-cost nitrogen & argon from the ASU, additional revenue streams*
- *Designed as a retrofit technology for existing facilities*
- *Low cost, simplified permitting*



# Our Technology Cont.

*Technology was co-developed  
with the DOE over a 10-year period*



## **Technology Development**

- *Large industrial furnaces (1995-97)*
- *JOC - DOE development program including pilot testing (2002-2012)*
- *JOC – DOE oxy-coal burner testing (2015-2018)*
- *Full scale oxy-coal burner testing (2021-2022)*
- *Ready for full scale demonstration at a commercial operating power plant (TRL 7)*
- *CCS FEED study completed for the retrofit of an existing 112 MW coal-fired unit with oxy-combustion carbon capture*

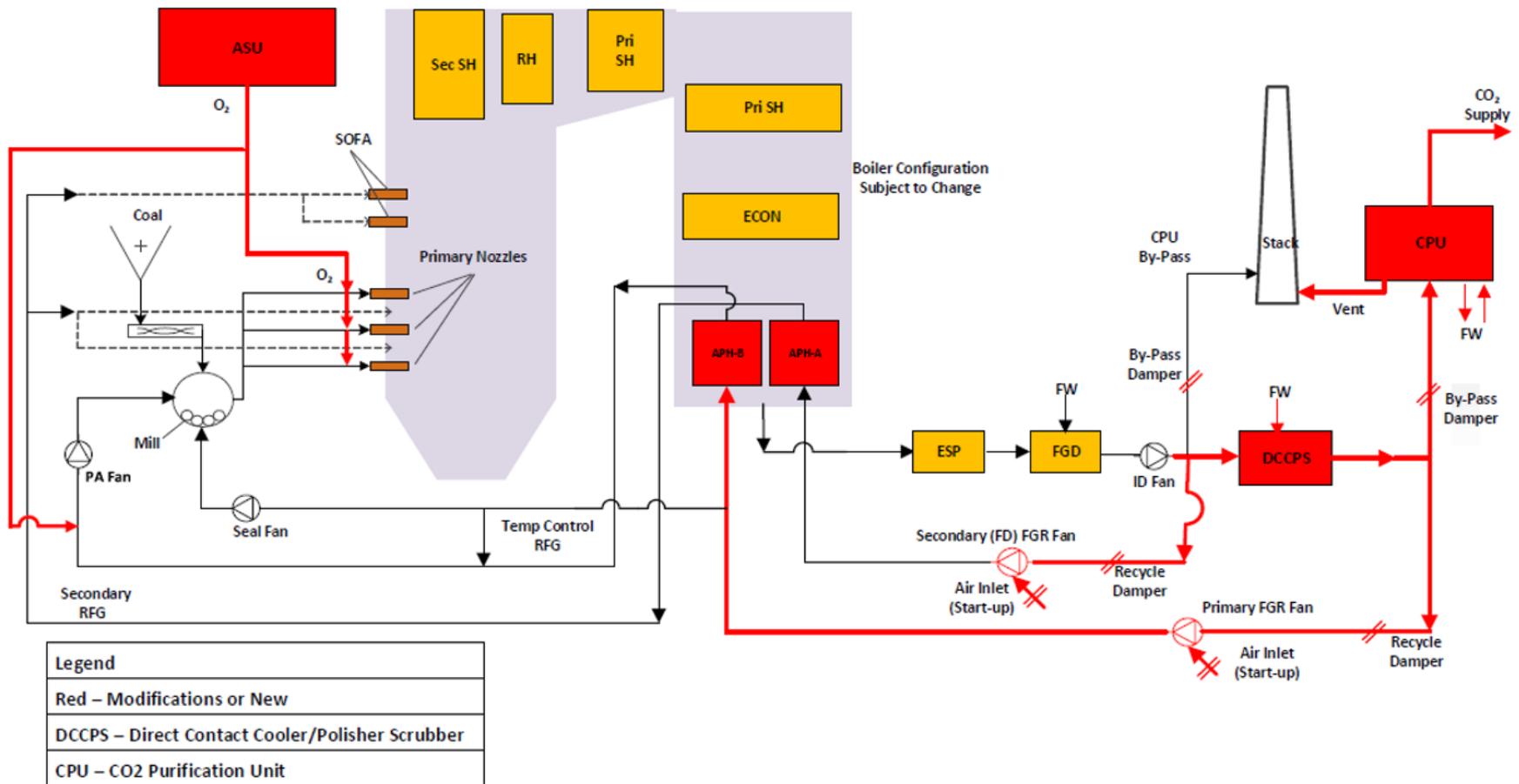
# Our Technology Cont.



## ***Technology Features & Benefits***

- *Lower cost basis than amine-based post combustion carbon capture technology*
- *Near-zero emissions, 97+% CO<sub>2</sub> capture rate*
- *NO<sub>x</sub> levels less than NSPS/BACT levels of 0.05 lb/MMBtu without NO<sub>x</sub> controls*
- *Water recovery from process for reuse*
- *Technology does not require the large steam load that amine-based post-combustion requires*
- *Simplified permitting*
- *Designed as a retrofit technology for existing power and industrial facilities*

# A Cost Effective Clean-Coal Pathway JOC Oxy-Combustion & Carbon Capture



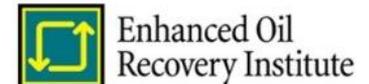
# What We Do

- *Pursuing CCS opportunities in the power and industrial sectors involving the retrofit of existing facilities*
- *Completed a FEED study for a CCS project in Wyoming*
- *Working on a test campaign for full scale testing of our newest patented oxy-fired burner*
- *Working with the U.S. DOE on the deployment of the technology*
- *Active participation in climate change and carbon capture centric organizations and initiatives*



# Industry Partners

- *Sargent & Lundy for overall engineering;*
- *Air Liquide for ASU and CO<sub>2</sub> separation;*
- *Babcock & Wilcox for environmental equipment;*
- *EORI for economics & P/L;*
- *General Electric for boiler services;*
- *EPRI for process and modeling;*
- *Reaction Engineer for boiler/burner modeling*

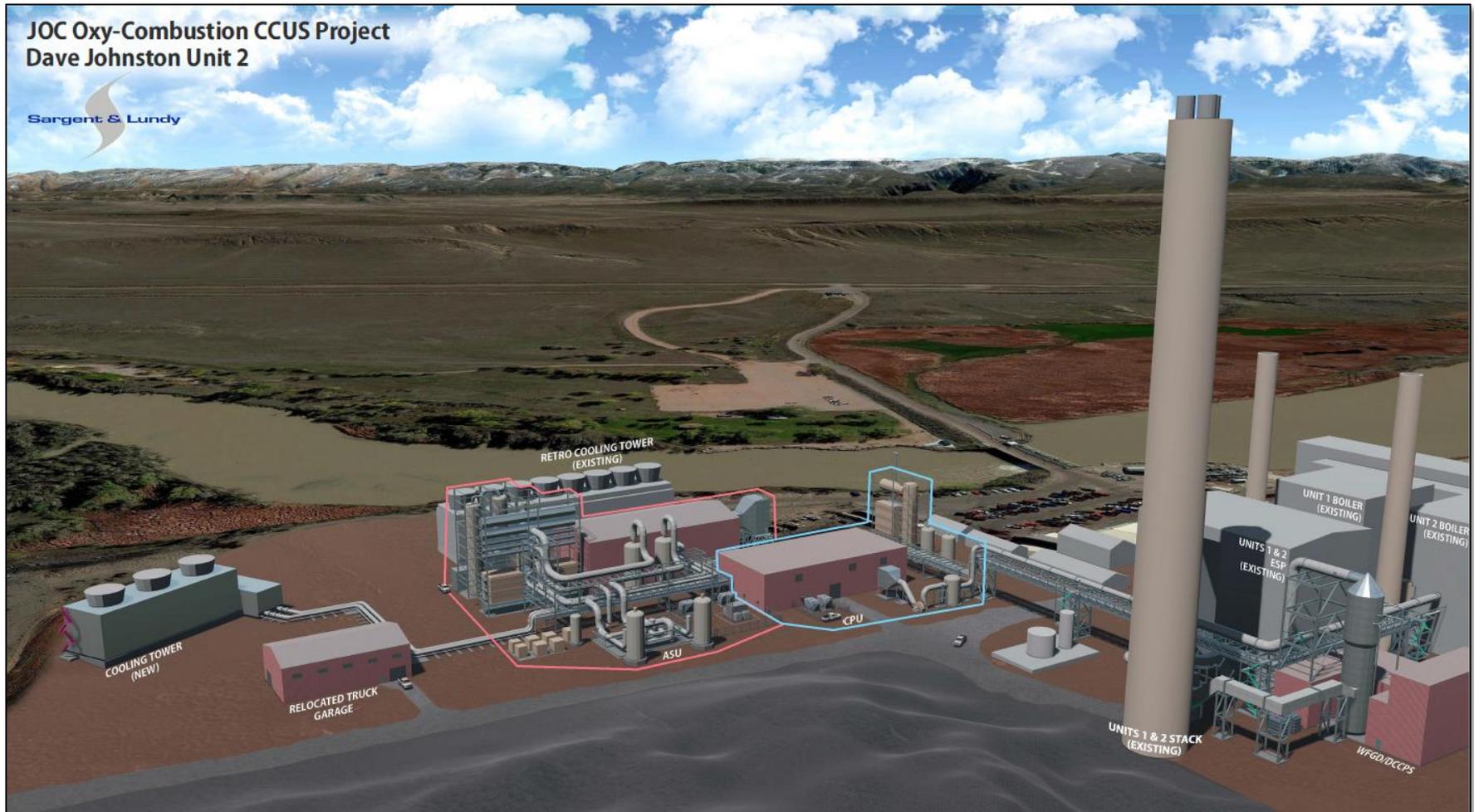


# PacifiCorp CCS Project Overview

- *The project site is PacifiCorp's Dave Johnston Power Plant in Glenrock, Wyoming.*
- *The project involves retrofitting an existing coal-fired boiler with JOC's high flame temperature oxy-combustion and carbon capture technology.*
- *The project captures, purifies and delivers CO<sub>2</sub> to a geologic storage and/or CO<sub>2</sub>-EOR site located nearby the power plant.*
- *CCS FEED Study was completed in July 2021*
  - *Retrofit of and existing 112 MW coal-fired unit with JOC's proprietary oxy-combustion technology and carbon capture*
  - *CO<sub>2</sub>-EOR or geologic storage*
  - *97+% CO<sub>2</sub> capture rate*
  - *NOx levels at 0.042 lb/MMBtu without NOx controls (below NSPS/BACT levels of 0.05 lb/MMBtu)*
  - *Technically and economically feasible*



# JOC – PacifiCorp CCS Project Dave Johnston Power Station, Glenrock, WY



# Jupiter's First Application – Industrial Furnaces



- *Jupiter's process has been used in large industrial melting furnaces since 1997.*
- *70% fuel usage decrease per pound of aluminum melted*
- *Ultra-low NOx emissions*



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# Thank You

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