

8 Rivers in Texas: deploying 8RH2 technology for carbon capture beyond 99%



Steve Milward

Chief Operating Officer
8 Rivers

8 RIVERS



Maulik Shelat

VP Product Development
8RH2, 8 Rivers

8 RIVERS



**AMMONIA ENERGY
ASSOCIATION**

**Wednesday, April 3, 2024
9AM EST • 4PM CET**

Carbon capture

- Steam Methane Reforming (SMR): About 2/3 of CO₂ is captured in existing ammonia plants (utilized for urea production or emitted), remainder 1/3 of CO₂ in the flue gas



International Journal of Greenhouse Gas Control

Volume 105, February 2021, 103239



Beyond 90% capture: Possible, but at what cost?

Patrick Brandl ^{a c}, Mai Bui ^{a c}, Jason P. Hallett ^b, Niall Mac Dowell ^{a c}  

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<https://doi.org/10.1016/j.ijggc.2020.103239> 

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Link: <https://www.sciencedirect.com/science/article/abs/pii/S1750583620306642>

Decarbonization toolkit for gas-based ammonia production

Steam methane reforming (SMR) Autothermal Reforming (ATR) 8RH_2



SMR & ATR Figures: Courtesy



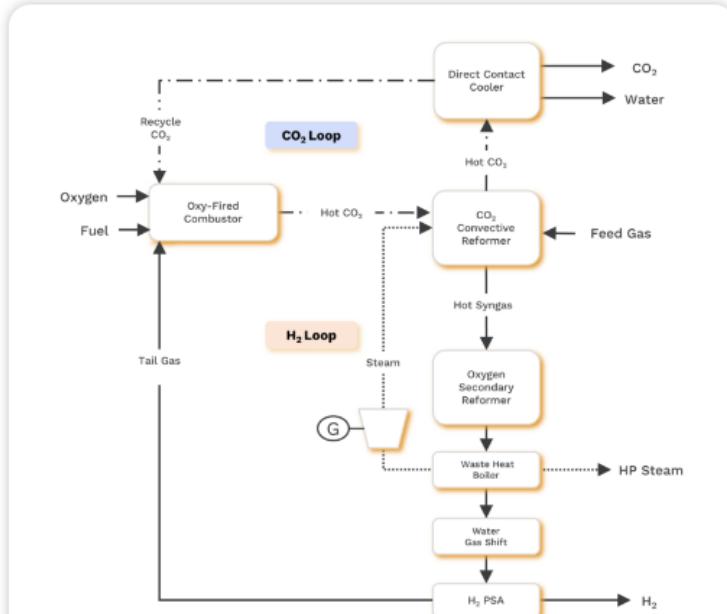
>99% carbon capture rates
possible

**Increasing carbon capture rate / decreasing carbon
capture cost**

Project Cormorant

8 Rivers to debut “ultra-low carbon” 8RH2 technology

8 Rivers will develop an 880,000 tonnes-per-year production facility in Port Arthur, Texas. Utilizing the proprietary 8RH2 hydrogen production process, “Project Cormorant” aims to complete construction by 2027, producing ammonia for local use & export to international markets. In an interview with Bloomberg, 8 Rivers’ COO Steve Milward confirmed that ammonia produced by Project Cormorant would be sold for power generation in South Korea, particularly co-firing in coal power plants. 8 Rivers investor SK Materials will support development of Project Cormorant.



Click to learn more. 8 River's proprietary 8RH2 process, which will be deployed for hydrogen & ammonia production in Port Arthur, Texas. Source: 8 Rivers.

Link: <https://ammoniaenergy.org/articles/project-cormorant-carbon-capture-based-ammonia-in-texas/>

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8RH₂

From Problem to Solution: How CO₂ Enables Affordable Clean Hydrogen

Steve Milward, Chief Operating Officer

Maulik Shelat, VP Innovation & Product Development



We believe in a net-zero world where clean energy powers human prosperity.

Pioneering the Clean Energy and Climate Future

Innovation | Commercialization | Deployment

Hands-On Execution Experience in Technology and Project Development

15 Years

In Clean Energy Development

>500

Patents Granted

>\$1B

Invested into 8 Rivers &
Our Past/Present Technologies

>\$75M

Grants Awarded

TECHNOLOGY DEVELOPMENT

8 Rivers has invented and partnered with a robust set of technologies to meet a diverse set of low-carbon energy challenges.

PROJECT DEVELOPMENT

The 8 Rivers project development engine specializes in marquee deployment of low-carbon projects.

SERVICES

8 Rivers is a net-zero services & solutions provider aiding project conceptualization & engineering design.

8 RIVERS

8 Rivers' Unique Place in the Energy Transition Market

8 Rivers has a pipeline of energy transition technologies under development and a business model that supports continuous innovation.



Zero-Emissions Power
from Solid Fuels



Zero-Emissions
Hydrogen and
Ammonia



Direct Air Capture of
CO₂ (DAC)



H₂S Sour Gas to
Sweet Gas



8 Rivers founded NET Power in 2010 and remained as a minority shareholder as it went public on the NYSE in June 2023.



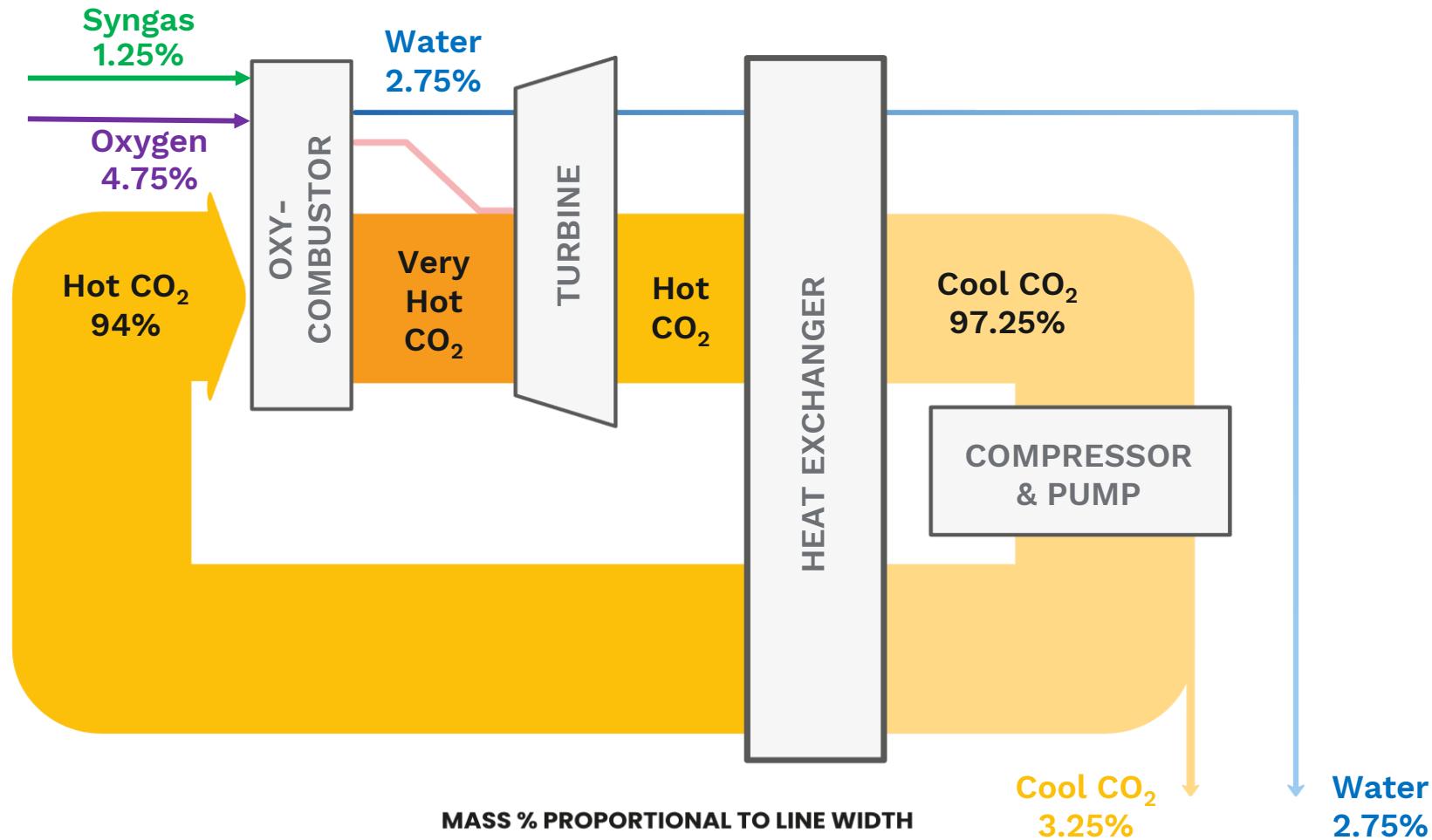
Rodney Allam MBE

Nobel Laureate
8 Rivers Chief Inventor

“I began work on developing cleaner energy systems in 1979.

I became obsessed with how you remove CO₂ emissions from industrial processes.”

Utilize the CO₂ - The Allam-Fetvedt Cycle



8RH₂ Hydrogen Production

8RH₂ vs ATR+95% CCS

10-15%

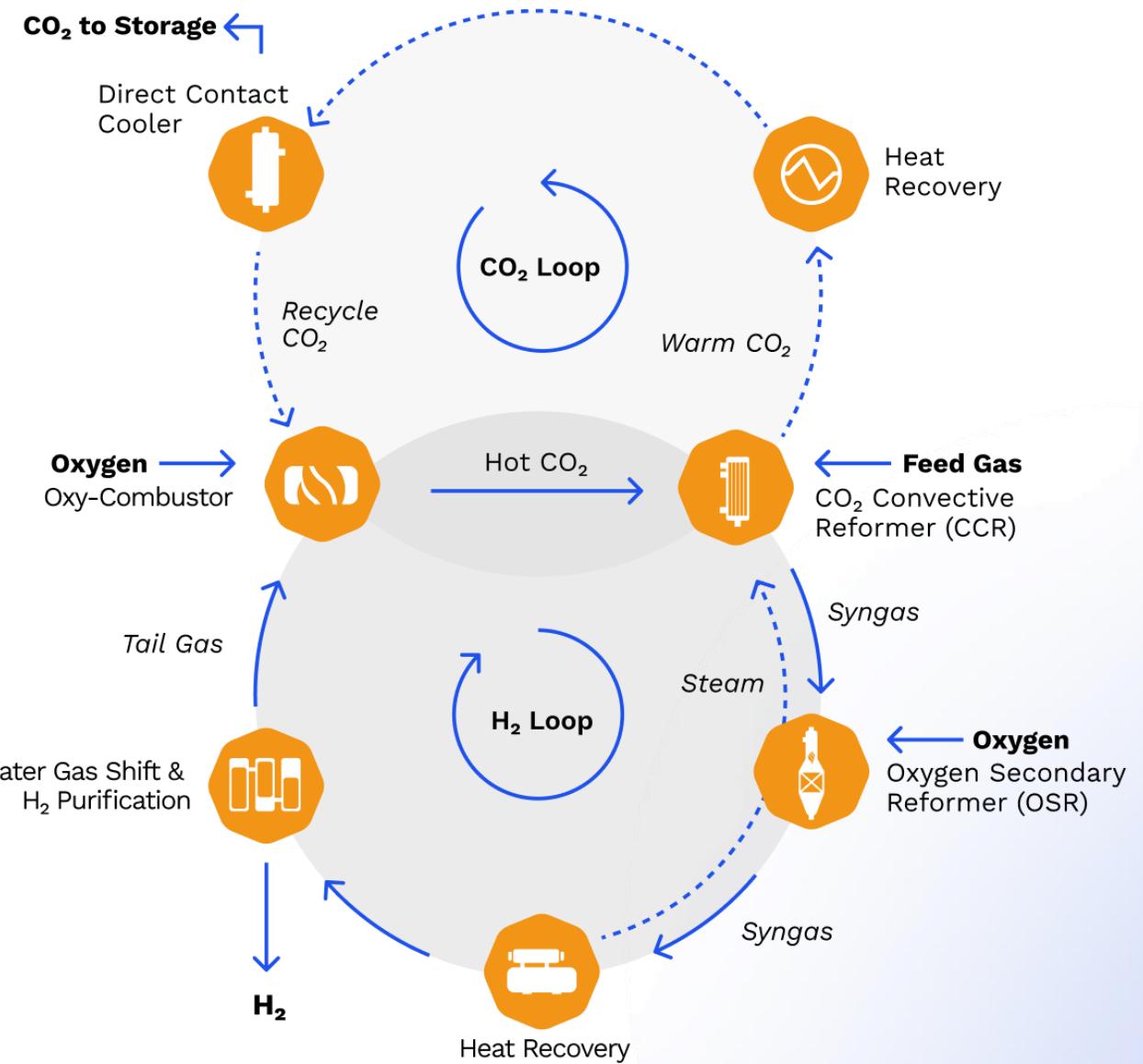
Lower leveled cost

15-20%

Lower carbon intensity

5-7%

More thermally efficient

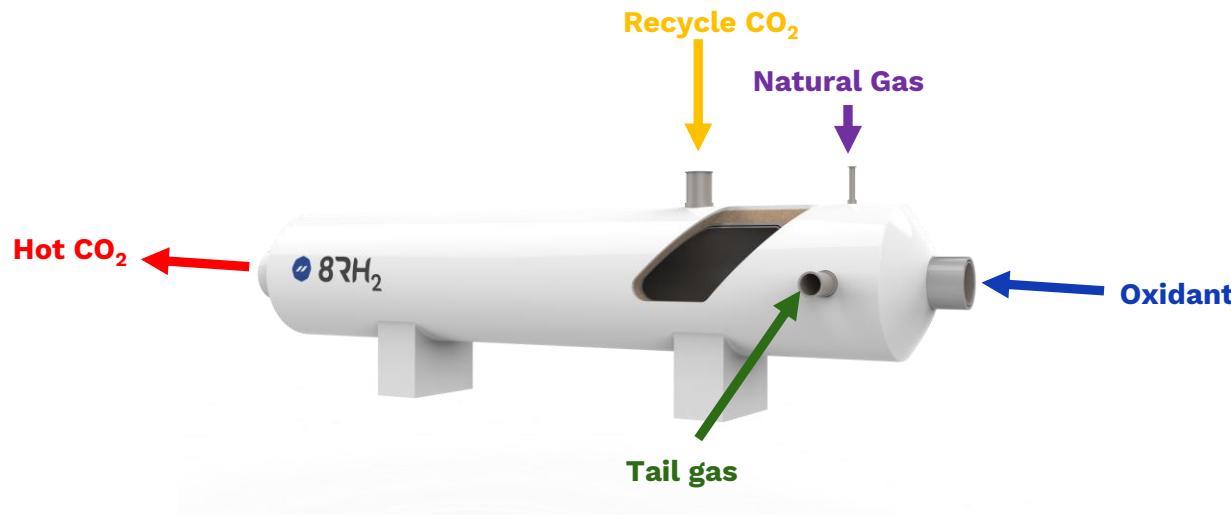


8RH₂ Differentiating Technologies

Oxy-Fired Combustor and CO₂ Convective Reformer innovate steam methane reformation

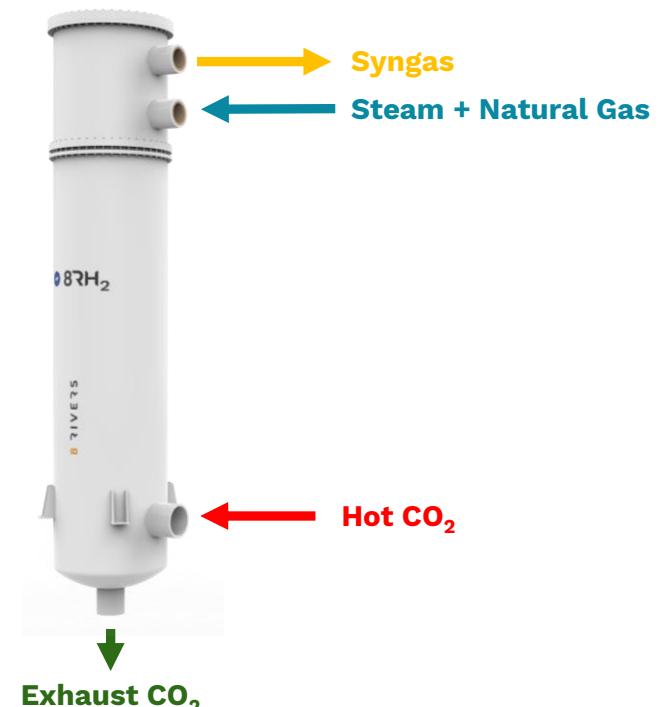
Oxy-Fired Combustor

Oxy-fuel combustion replaces air in the typical combustion process with pure oxygen diluted with CO₂. By eliminating the impurities of air, oxy-fired combustion results in an exhaust stream of high-quality CO₂ and water, **eliminating the need for costly back-end carbon capture equipment.**



CO₂ Convective Reformer

8 Rivers proprietary CO₂ Convective Reformer for hydrogen production reforms natural gas and steam mixture utilizing heat delivered by CO₂ from oxy-combustor.





Clean **Fuels**
Clean **Air**
Clean **Jobs**

Cormorant Clean Energy
Port Arthur, Texas

Cormorant Clean Energy



'Cheaper and cleaner' | First giga-scale project using novel 'ultra-low-carbon' blue hydrogen tech announced

8 Rivers plans to build a billion-dollar ammonia complex in Texas, with more than 99% of CO2 captured

9 January 2024 14:06 GMT UPDATED 9 January 2024 15:34 GMT

By [Polly Martin](#)

 **Hydrogeninsight**

Key Partners

FLUOR®



 **AtkinsRéalis**

 **CASALE**



**Ammonia production annually
880,000 tonnes**

**CO₂ captured annually
~1.5 million tonnes**

**Permanent Jobs Created
95+**

**CO₂ capture rate
>99%**

**Location
Port Arthur, TX**



8 RIVERS

