

Eliminate DEF Logistics.

- ✓ No DEF Deliveries.
- ✓ No DEF Storage.

**H₂SCR**TM
Hydrogen-Powered Selective Catalytic Reduction



HOW ON-DEMAND GREEN AMMONIA ADDRESSES MANY DEF CHALLENGES

A system such as GreenDeNOx™ that generates gaseous ammonia on-site could potentially eliminate:



TRADITIONAL DEF CHALLENGES

- ❌ DEF Transportation
- ❌ DEF Storage Tanks
- ❌ Freeze Protection Systems
- ❌ Shelf-Life Concerns
- ❌ Replenishment Logistics
- ❌ DEF Crystallization Issues
- ❌ Bulk DEF Inventory Management



ON-DEMAND GREEN AMMONIA SOLUTION

- ✅ No More Shipping
- ✅ No More Storage
- ✅ No More Frozen DEF
- ✅ No More Expired DEF
- ✅ No More Replenishment Logistics
- ✅ No More Crystallization Issues
- ✅ No More Bulk Inventory Management



Instead, ammonia would be produced as needed and injected directly into the SCR system, reducing dependence on the DEF supply chain while maintaining NOx reduction capability.



NO MORE
SHIPPING



NO MORE
STORAGE



NO MORE
FROZEN DEF



NO MORE
EXPIRED DEF

GENERATE AMMONIA ON DEMAND.



SIMPLER OPERATIONS



LOWER COSTS



REDUCED EMISSIONS



GREATER RELIABILITY



SUSTAINABLE SOLUTION



Hydrogen-Powered Selective Catalytic Reduction

DEF SOLVES ONE PROBLEM. WE SOLVE THE OTHER.

DEF creates a significant logistics and carbon footprint while solving a different environmental problem.

THE DEF MARKET IS HUGE.

Industry estimates place the global DEF market at

\$40-45 billion

per year in 2025.



OUR TECHNOLOGY
REPLACES THAT

CO₂-FREE



Hydrogen-Powered
Selective Catalytic
Reduction

THE CARBON COST IS REAL.

Total DEF supply chain emits

23-65 million tons CO₂/year



HIGH COST. HIGH EMISSIONS. COMPLEX LOGISTICS.

VS



SIMPLE. EFFICIENT. ZERO CO₂ EMISSIONS.

H₂SCR REDEFINES CLEAN.

Solving today's emissions challenges without creating tomorrow's.



Eliminate DEF and Earn Carbon Credits

CO2 Credits Approx Value For Global Reduction in DEF

Annual CO2 Saved	Low Price (\$7/ton)	High Price (\$24/ton)
23 million tonnes	\$161 million	\$552 million
65 million tonnes	\$455 million	\$1.56 billion

|

HYDROGEN + NITROGEN → AMMONIA ON DEMAND

HYDROGEN SOURCE

From Any Source
(Electrolysis / SMR / Other)



NITROGEN SOURCE

From Air (PSA)



CATALYZED REACTOR

Haber-Bosch Process



OVERALL REACTION



Conditions:
350–550 °C | 100–250 bar | Catalyst

AMMONIA INJECTED INTO SCR FOR NO_x REDUCTION

On Demand

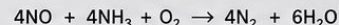
NH₃ INJECTION

ENGINE
EXHAUST
(NO_x)

NO
NO₂



SCR REACTION



(Over a temperature window)

KEY BENEFITS



On-Demand Ammonia

Produce only what
you need, when you need it.



Zero Ammonia Storage

Eliminates storage,
handling, and slip risks.



High Efficiency NO_x Control

SCR with ammonia delivers
> 90% NO_x reduction.



Flexible & Scalable

Modular systems for any
site or application.

CO₂-FREE HYDROGEN & CARBON BLACK PRODUCTION

ZERO CO₂ RELEASED TO THE ATMOSPHERE

INPUTS

Any one or more of the following



WATER
H₂O



DIESEL
C₁₀-C₂₀



NATURAL GAS
CH₄



PLASTIC WASTE
(PE/PP)



**HEAVY OIL
& BITUMEN**
C₂₀+

OUR PROPRIETARY THERMAL DECOMPOSITION PROCESS



**HIGH
TEMPERATURE
PROCESS
(NO OXYGEN)**



HYDROGEN
CLEAN ENERGY
ZERO CARBON



CARBON BLACK
HIGH VALUE MATERIAL
FOR MULTIPLE INDUSTRIES

All carbon from the
feedstock is captured
as solid carbon

**SOLID CARBON
CAPTURE**



No CO₂ formed.
No CO₂ released.
Ever.

**ZERO CO₂
RELEASED TO
THE ATMOSPHERE**



CARBON IS CAPTURED
AS SOLID CARBON
CLEAN. SUSTAINABLE.
FUTURE-READY.



NO CO₂ EMISSIONS
Zero CO₂ released
to the atmosphere



**ENVIRONMENTALLY
RESPONSIBLE**
Contributes to a
cleaner planet



**RESOURCE
FLEXIBILITY**
Works with a wide
range of feedstocks



HIGH VALUE OUTPUTS
Hydrogen for clean energy.
Carbon black for industry.

All Markets **H2SCR.com** Applies To

Hydrogen Selective Catalytic Reduction (H₂SCR) solutions for a cleaner, more sustainable future



Power Generation

Coal, natural gas, biomass
and hybrid power plants



Industrial Boilers

Process heat, steam, and
facility boilers



Cement

Rotary kilns, preheaters,
and calciner systems



Metals & Steel

Reheating furnaces, boilers,
and process heaters



Oil & Gas

Refineries, process heaters,
and hydrogen plants



Chemicals

Process furnaces, boilers,
and thermal oxidizers



Pulp & Paper

Recovery boilers, lime kilns,
and power boilers



Waste-to-Energy

Incinerators and boilers for
waste-derived fuels



Biomass & Biogas

Boilers and gas engines
using renewable fuels



Marine

Marine engines and boilers
(current and future)



Heavy-Duty Transportation

On-highway trucks and
off-highway equipment



Rail

Locomotives and rail
support equipment



Mining & Construction

Off-road equipment and
stationary power



Data Centers

Backup power generators
and cogeneration systems



Defense

Tactical vehicles, generators,
and field power systems



H2SCR™ technology helps industries across the globe reduce NO_x emissions with hydrogen as the reducing agent—delivering high performance, operational flexibility, and a path to a low-carbon future.

All Methods of Making Hydrogen

Multiple pathways to produce hydrogen for a clean, flexible, and sustainable energy future

1. Steam Methane Reforming (SMR)

Most common method



Natural gas reacts with steam at high temperature over a catalyst to produce hydrogen and carbon dioxide.

Mature Technology | Low Cost

2. Steam Methane Reforming with Carbon Capture (SMR + CCUS)

Lower carbon intensity



Same as SMR, but CO₂ is captured and stored underground (CCS) or utilized.

Lower Emissions | Transitional Solution

3. Autothermal Reforming (ATR)

Efficient for large scale



Partial oxidation of natural gas with oxygen and steam produces hydrogen, CO₂, and heat in one step.

High Efficiency | Lower Emissions

4. Methane Pyrolysis

Emerging low-carbon method



Natural gas is heated in the absence of oxygen to produce hydrogen and solid carbon instead of CO₂.

Potentially Very Low Emissions

5. Water Electrolysis (Alkaline)

Mature technology



Electricity splits water into hydrogen and oxygen using an alkaline electrolyte.

Zero Direct Emissions | Scalable

6. Water Electrolysis (PEM)

Fast response & flexible

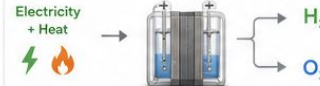


Proton Exchange Membrane electrolyzers use electricity to split water with a solid polymer electrolyte.

High Purity | Flexible Operation

7. Water Electrolysis (Solid Oxide)

High efficiency



High-temperature electrolysis that uses heat and electricity for greater efficiency.

High Efficiency | Emerging

8. Biomass Gasification

Renewable feedstock



Biomass is gasified to produce syngas (CO, H₂), then shifted to increase hydrogen.

Renewable | Low-Carbon Potential

9. Bio-photolysis

Direct solar to hydrogen



Microorganisms (like algae) use sunlight to split water and produce hydrogen directly.

Renewable | Early Stage

10. Thermochemical Water Splitting

High-temperature cycles



Heat-driven chemical cycles split water into hydrogen and oxygen.

Potential for Low Cost | Emerging

11. Nuclear-Powered Electrolysis

Reliable clean power

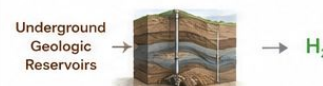


Nuclear electricity powers electrolysis for low-carbon, baseload hydrogen production.

Low-Carbon | Reliable

12. Geologic Hydrogen (White Hydrogen)

Natural underground source



Hydrogen naturally occurring in the Earth's crust is explored and extracted.

Natural | Early Exploration



Hydrogen can be produced from fossil fuels, water, biomass, sunlight, nuclear energy, and natural sources. Each method has unique advantages and is suited to different applications and sustainability goals.



Low / Zero Emissions
Potential



Mature
Technology



Emerging
Technology

HYDROGEN + EXHAUST CONVERSION

CLEANER EMISSIONS. REAL SAVINGS.

Convert hydrogen + exhaust stream for 13.5 kW using any source of hydrogen.



ECONOMICS



ANNUAL SAVINGS (BEFORE HYDROGEN COST) \$357,408 PER YEAR
minus cost of hydrogen



Actual hydrogen cost will vary based on source, pricing, and usage rate of 2.12 kg/hr.

DANIEL WELLS

FOUNDER & CEO

With more than **30 years** of experience in Information Technology, Daniel specialized in



ERP Systems



Accounting Software



HR Software



Point of Sale Solutions



E-commerce



Custom Software Development



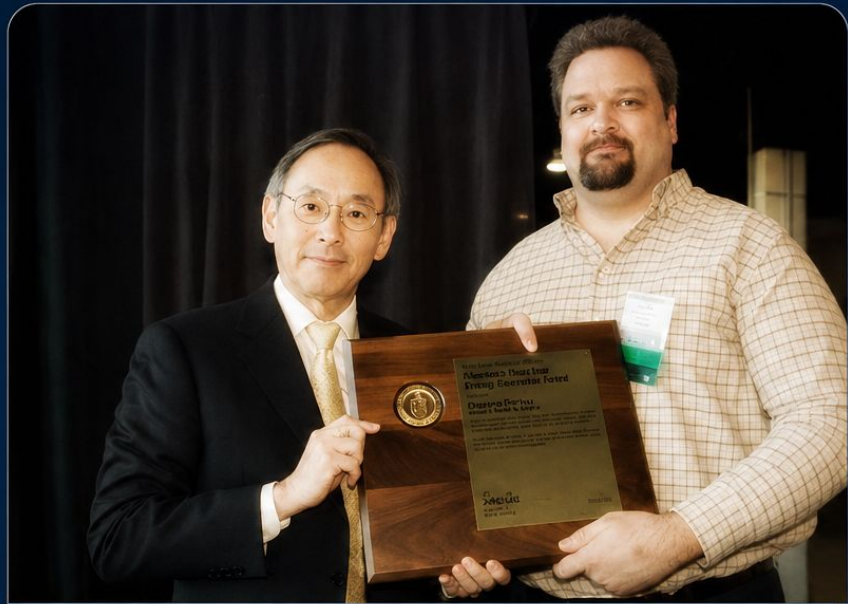
Internet Marketing



He has sold over

\$200 MILLION

worth of goods for his employers.



Nobel Prize Winner, and Secretary of Energy
Dr. Steven Chu, presents Daniel Wells,
Founder and CEO of Umpqua Energy, Inc.,
with the **America's Next Top Energy Innovator Award**.
- February 2012

PROFESSIONAL CERTIFICATIONS





CMXI.ORG

A NON-PROFIT DEDICATED TO THE FUTURE

CMXI is a non-profit organization established to promote innovation, education, and technology for the benefit of humanity.



OUR MISSION

To advance solutions that create a better future for all.



OUR FOCUS

Innovation, education, sustainability, and global collaboration.



OUR COMMITMENT

Operating transparently and responsibly for the public good.



INTELLECTUAL PROPERTY

All intellectual property, including patents, will be owned by CMXI.org.



DOMAIN DONATION

Daniel Wells will donate all domain names to CMXI.org.



FOR THE PUBLIC GOOD

All assets and rights are held in trust for humanity.

BUILDING
A BETTER
TOMORROW
TOGETHER



CMXI

INNOVATE
BUILD
TRANSFORM