

A New Approach to Distributed Hydrogen & Power

Developing a new way to produce hydrogen where energy is needed - using Acoustic Resonance Chord technology.

Produce Hydrogen Locally. Generate Power Locally. Build Energy Independence.

The Opportunity

Electricity demand is growing rapidly as data centers, artificial intelligence, advanced manufacturing, transportation and other energy-intensive industries require increasingly large amounts of reliable, continuous power. Expanding conventional grid capacity can require years of permitting, transmission construction and infrastructure investment.

Hydrogen offers a potential alternative, but it can be costly to produce, transport, compress, store and distribute. **H4H is developing a different approach: produce hydrogen at or near the location where the energy is actually needed.**

ARC - Acoustic Resonance Chord

Hydrogen for Humanity (H4H) is developing the **Acoustic Resonance Chord (ARC)**, an experimental technology designed to produce hydrogen and oxygen from water without relying on conventional electrolysis. ARC uses acoustic energy and multiple frequencies to create a resonant process intended to facilitate the separation of water into hydrogen and oxygen.

WATER -> ARC -> HYDROGEN -> FUEL CELL -> ELECTRICITY

Instead of centralized hydrogen production followed by transportation to the customer, ARC is being developed around a decentralized model: **produce the hydrogen where the energy is needed.**

The Data-Center Opportunity

Data centers represent one of the most compelling potential applications for distributed power generation. The examples below illustrate the scale of electricity consumption for continuously operating facilities:

100 MW	500 MW	1 GW
876 million kWh/year	4.38 billion kWh/year	8.76 billion kWh/year
\$87.6M/year at \$0.10/kWh	\$438M/year at \$0.10/kWh	\$876M/year at \$0.10/kWh

Illustrative calculations assume continuous operation and \$0.10/kWh. Actual facility loads and electricity prices vary.

H4H's objective is not necessarily to replace the grid immediately. ARC-powered fuel-cell systems could potentially begin as supplemental or backup generation and, where validated performance and economics justify it, develop toward primary power applications.

The Economic Objective

H4H believes the greatest commercial potential for ARC may ultimately come from combining on-site hydrogen production with fuel-cell electricity generation.

15-25%

Potential Energy-Cost Reduction Target

As an initial development objective, H4H is investigating whether an integrated ARC system could ultimately reduce applicable energy costs by approximately **15-25%** for certain high-energy-use applications. For facilities spending tens or hundreds of millions of dollars annually on electricity, an improvement of this magnitude could translate into substantial economic value.

Important: The 15-25% figure is a development target, not a guaranteed savings claim. Actual economics will depend on independently validated ARC performance and complete system costs, including equipment, fuel cells, water treatment, gas handling, maintenance, financing, installation and operating conditions.

Expanding the Potential: Seawater

Another important H4H research objective is to determine whether future ARC systems can operate using **seawater without requiring conventional desalination as a separate pretreatment step.**

If successfully demonstrated, this capability could expand deployment in coastal regions, islands and locations where seawater is abundant but freshwater may be limited or costly. Reducing or eliminating separate desalination requirements could also reduce system complexity and support H4H's objective of producing hydrogen locally from resources available at or near the point of use.

Direct seawater operation without conventional desalination has not yet been independently validated and remains an H4H research and development objective.

Development Roadmap

PHASE 1 - PROVE IT

Independently validate hydrogen production, electrical consumption, production rate, purity, temperature, pressure, water consumption and complete system energy balance, while investigating seawater compatibility.

PHASE 2 - BUILD IT

Develop a continuous-operating ARC prototype with automated frequency control, gas separation, safety systems and water management.

PHASE 3 - POWER IT

Connect ARC hydrogen production to a commercial fuel cell and demonstrate continuous electricity production.

PHASE 4 - DEPLOY IT

Establish a commercial pilot installation in an appropriate industrial or commercial environment.

PHASE 5 - SCALE IT

Develop modular ARC/fuel-cell systems for increasingly larger commercial facilities and, ultimately, data centers.

A Distributed Energy Future

The H4H vision extends beyond data centers. Manufacturing facilities, warehouses, transportation fleets and coastal facilities could potentially produce hydrogen or electricity near the point of use. ARC remains a technology under development; its performance, reliability and commercial economics must be independently demonstrated before these applications can become commercial claims.

HELP US PROVE WHAT'S POSSIBLE.

Hydrogen for Humanity is seeking strategic relationships with organizations interested in hydrogen production, distributed energy, fuel-cell power, data-center infrastructure and technology validation.

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