Herl Technologies

High-Efficiency Radiolysis: Nuclear Hydrogen

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New Reality:

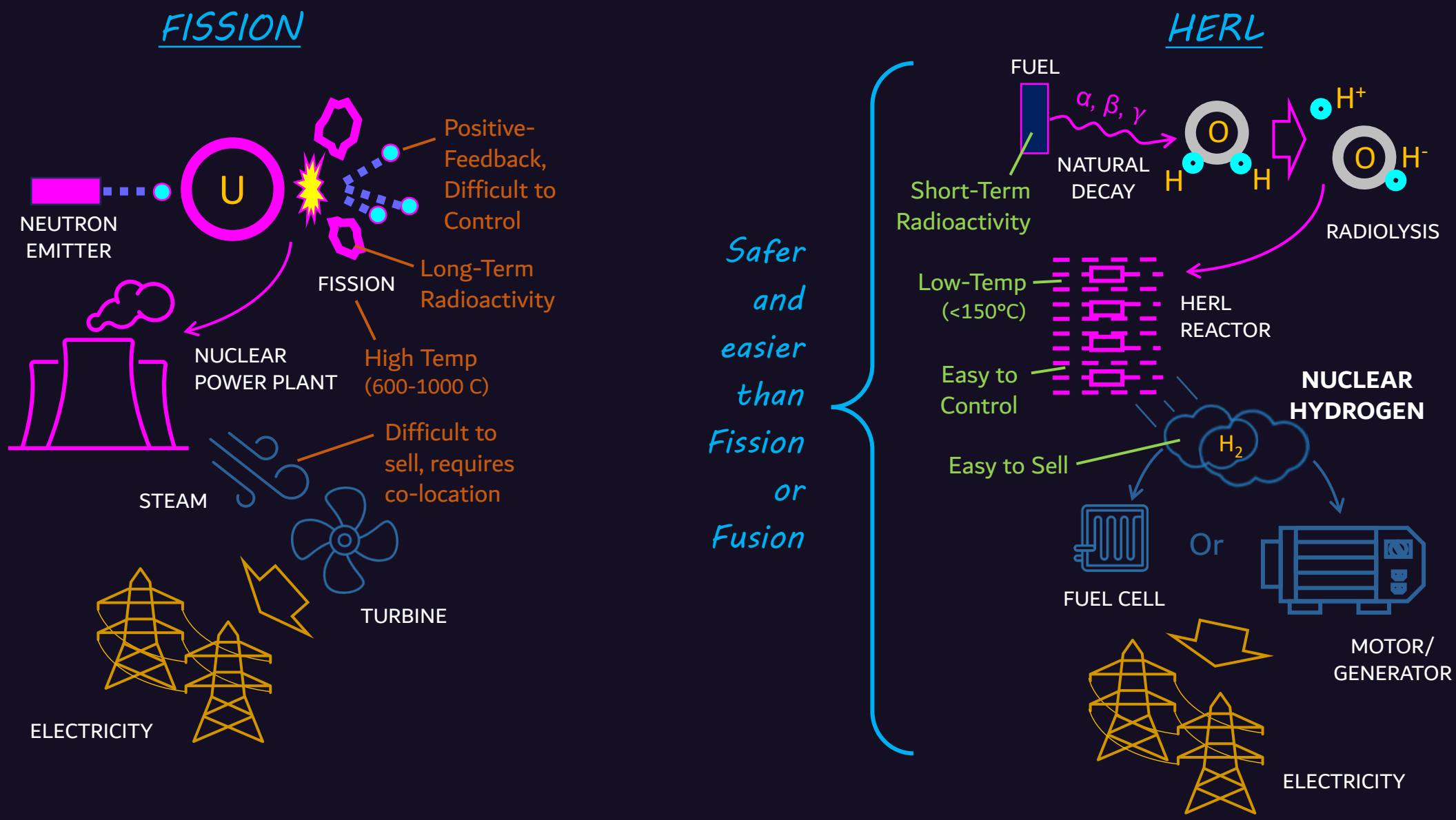
"Energy security, not climate activism, is now the primary driver of global energy transformation"

- Jeff Currie, Chief Strategy Officer, Carlyle Group Private Equity

Herl Tech's Mission and Value Proposition:

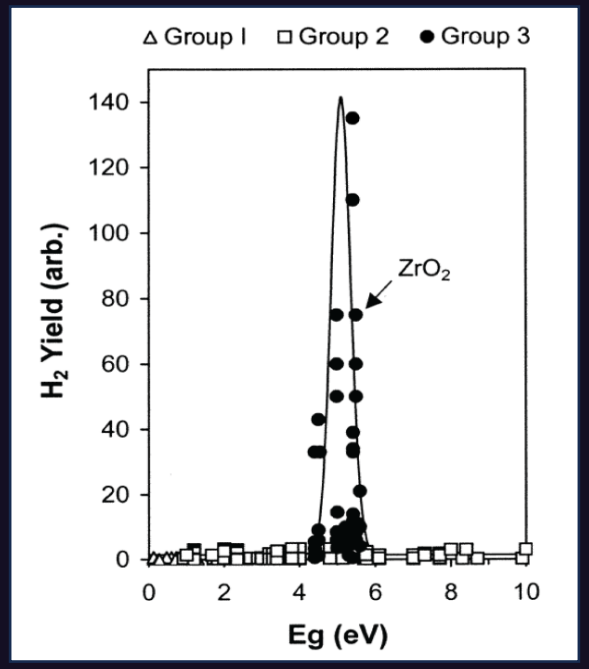
Herl Technologies will reduce energy scarcity by developing a new, safer form of nuclear power that will simultaneously solve the challenges of Energy Security and the Hydrogen Economy.

HERL™ is a New Form of Nuclear Power Based on the Radiolysis of Water



High Efficiency Radiolysis (HERL™) Enhanced Electrolysis

HERL TECHNOLOGIES is proposing a **unique application of** the concepts of **RADIOELECTROLYSIS** [1] and **RADIATION CATALYSTS** [2] **with new technology exclusively owned by HERL TECH**, to create a revolutionary method of hydrogen production.



Research cited by Le Caër showing levels of hydrogen when various water saturated oxide surfaces are irradiated with γ rays.

What is RADIOELECTROLYSIS ?

A term coined by Dr Genn Saji, Ex-Secretariat of the Nuclear Safety Commission of Japan (retired), for **the excess generation of hydrogen gas caused by the radiolytic ionization of water in the presence of an electric field.**

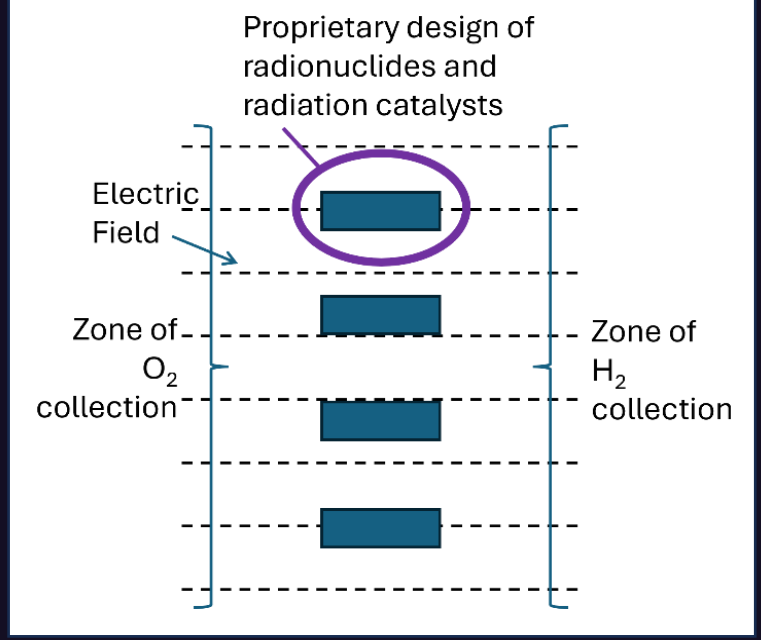
What are RADIATION CATALYSTS ?

A term used by Dr Sophie Le Caër, Research Director at the Interdisciplinary Laboratory of the Atomic Energy and Alternatives Energies Commission of France, to describe **materials** that have a band-gap energy similar to the hydroxyl (O-H) bond strength of water, **that increase the generation of hydrogen gas in the presence of ionizing radiation.**

1 Saji, Genn. (2014). Review on Water Radiolysis in the Fukushima Daiichi Accident: Potential Cause of Hydrogen Generation and Explosion. International Conference on Nuclear Engineering, Proceedings, ICONE. 1. 10.1115/ICONE22-30991.
2 Le Caër, S. (2011). Water Radiolysis: Influence of Oxide Surfaces on H2 Production under Ionizing Radiation. Water, 3(1), 235-253. DOI: 10.3390/w3010235

High-Efficiency Radiolysis is a Combination of 3 Technologies

- Two of our three core technologies have been independently validated at TRL 5.
- We're raising $1M to prove the third and demonstrate the integrated system.



Concept diagram of a HERL system.

Preliminary data, system designs and assumptions can be shared under NDA

Why is HERL safer than Fission or Fusion?

- No extreme temperatures
- No complex heat management needed
- No difficult to control positive-feedback loops
- No long-term radioactivity

Can lead to faster adoption and deployment to more quickly meet energy demands

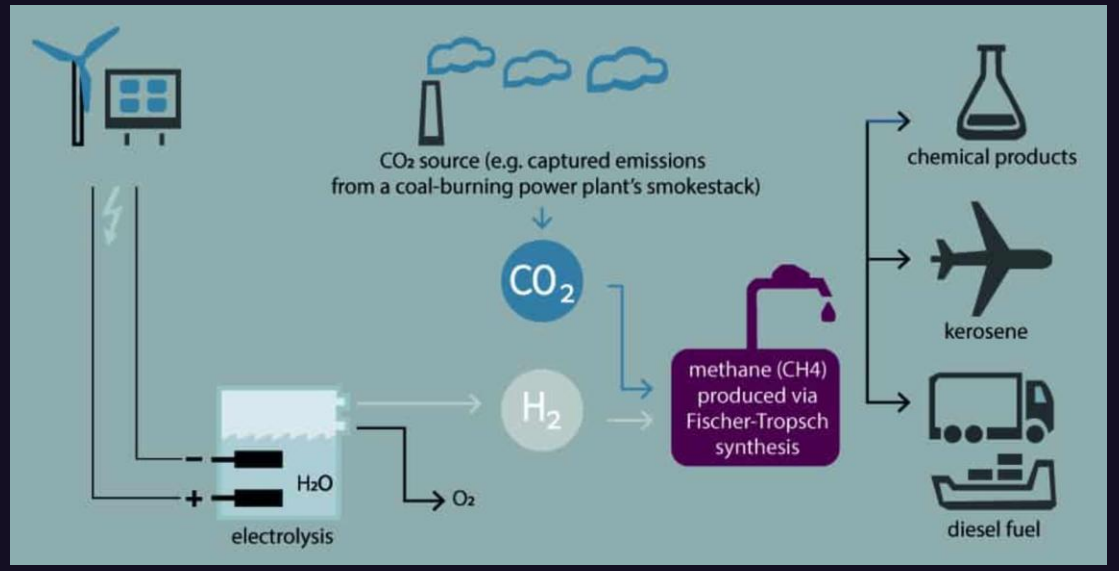
HERL TECHNOLOGIES Intellectual Property

Provisional Patent covering:

- **Designs** for optimal use of Radioelectrolysis (TRL-5) and Radiation Catalysts (TRL-5)
- **Materials and Methods** for accessing the ionization energy of Alpha and Beta particles (TRL-2)
- **Data** supporting ability to access Alpha and Beta energy

Other applications of HERL

- Power to Gas (LNG from CO_2 + H_2O)
- Higher-Level Organic Synthesis (eg C_3H_7OH)
- Removal of forever chemicals from water
- Industrial Sterilization Processes



https://as-schneider.blog/2022/03/02/what-are-power-to-x-solutions/

Challenges of Energy Security and the Hydrogen Economy

Challenges of Energy Security

	HERL	Solar	Wind/Wave	SMR	Coal/NG/Oil
Decentralized	✓✓*	✓✓*	X	X	X
Consistent/Reliable	✓	X	X	✓	✓
Protected/Secured	✓	X	X	X	X
Low/No Carbon	✓	✓	✓	✓	XX

Challenges of the Hydrogen Economy

	HERL	Green	Blue	Grey	Red/Pink
Cost[1]	✓	X	✓	✓	✓
Net Power	✓	X	X	X	X
Transportation & Storage	✓**	X	X	X	X
Low/No Carbon	✓	✓	✓	X	✓

[1] The cost of HERL hydrogen is expected to be at least 60% less than green hydrogen, based on voltage needs, and potentially greater than 80% less (e.g., < €1/kg H_2). However, HERL's value proposition is associated with satisfying needs of both energy security and the hydrogen economy, not just cost alone.

* Solar is the ideal decentralized/distributed energy source when it is placed on or near the facility it is providing power to. HERL can replicate this model, depending on fuel type, by being buried next to the building to be energized.

** HERL can solve hydrogen transportation & storage challenges because it is net-power-positive, has no carbon emissions, can be deployed locally and built-to-suit the needs of the facility it is providing hydrogen/power to.

Why Has Nobody Done this Before?

Our Guess-

Radiation Catalysts and Radioelectrolysis are unknown in industry and, historically, have not been an area of active research in academia. However, this is beginning to change with recent academic reports investigating one or both of these phenomena and demonstrating improvements over conventional hydrogen production methods.[1]

Why Now?

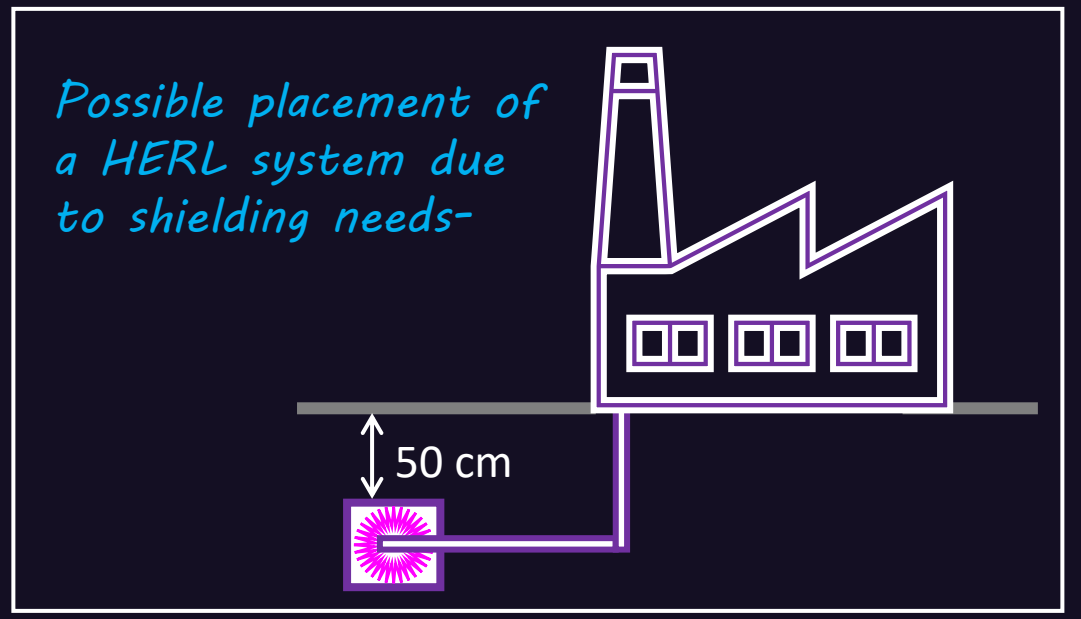
Only due to new, patent pending materials science discoveries and resulting designs made by Herl Tech, enabling the use of safer radioactive fuels, will Nuclear Hydrogen move out of academic research and into commercial reality.

1 https://doi.org/10.1016/j.nucengdes.2025.114511

Fuel Options

- **Naturally Occurring Radionuclides-** Scaled-up extraction methods (already demonstrated at ORNL, USA [1])
- **Synthetic Radioisotopes-** 'Industrialized' manufacturing processes (already demonstrated in Qinshan, China [2])
- **Fission Products-** Current High-Level Nuclear Waste (HLW) recycling projects are underway in the US, UK, Japan and South Korea for Nuclear Battery production.

Half a tablespoon of the right isotope could provide enough energy for an average household for 10 years. [1kgH_2/day]



1 https://www.energy.gov/em/articles/oak-ridge-project-boosting-isotope-supply-cancer-treatments
2 https://www.sustainability-times.com/research/china-just-did-the-impossible-yttrium-90-cancer-isotope-produced-in-commercial-reactor-sparks-medical-and-nuclear-shockwaves/

Opportunity

Revenue

- HERL Technology Licensing
  - Electrolysis Companies
  - Chemical Synthesis Companies
  - Water Purification Companies
- Hydrogen Production Systems
  - Hydrogen refueling stations
  - Hydrogen co-injection with NG
- **Power Generation Systems**
  - EaaS
  - EaaP

Goal

All Income Sources Provide Recurring Revenues

Competition (Power)

- Solar
- Wind & Wave
- Fission (SMR), Fusion & Nuclear Batteries
- Petroleum

Markets

	2023-24 US$ B	2032-34 US$ B	CAGR %
Hydrogen Generation	176	278	5·8
Solar	273	436	6
Wind	89	260	10
Total Renewables	1,085	2,271	9·5

Hydrogen https://www.fortunebusinessinsights.com/industry-reports/hydrogen-generation-market-100745
Solar https://www.fortunebusinessinsights.com/industry-reports/solar-power-market-100764
Wind https://www.environmentenergyleader.com/stories/future-trends-in-wind-energy-2608-billion-growth-by-2034,44970?
Renewable https://straitsresearch.com/report/renewable-energy-market

HERL TECH Founder

Michael McNeely, PhD, PMP- President/CEO

- Dr McNeely is a serial inventor & entrepreneur
  - Over 40 patents
  - Founded 3 companies
  - PhD in BioEng from the Univ of Utah, Mat Sci focus
- Certified as a Project Management Professional (PMP) from PMI, #3907087, exp 08/2027

BioMicro Systems, Inc

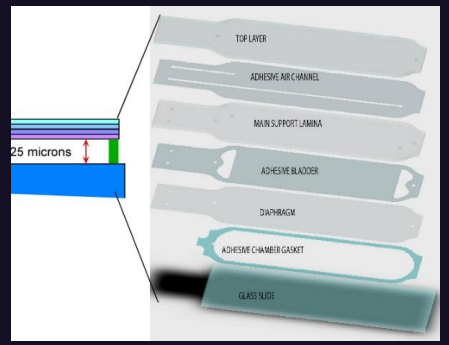
- Founder, initial Pres/CEO, later CTO
- Developed the MAUI™ Hybridization System
- Sold to Roche Diagnostics in 2010

GattaCo Inc

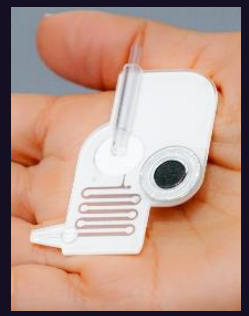
- Co-Founder, initial Pres/CEO, later Director Global Business Development
- Developed the A-PON® Plasma Separator
- Collaboration with Mitsubishi Pharma
- Used by SpaceX during Inspiration4 flight

Macko Labs Inc

- Consulting
- HERL Technology Development



MAUI™ Hybridization System



A-PON® Plasma Separator

Radiation Science Research-

Dr McNeely spent 18 months studying Radiation Safety, Nuclear Physics & Radiochemistry at the Radioisotope Research Facility of Tokyo Metropolitan University as a part of a project funded, in part, by Fukushima Prefecture. The purpose of the project was to develop a low-cost Radio Bio-Assay for the detection of radioactive particles in urine. Principles studied are directly relevant to HERL.

Key Risks

- Fuel Availability- 'Ideal' fuels (low-gamma) are currently limited in their availability and time will be needed to scale-up to satisfactory levels. High-gamma fuels can be used in the interim but may then be limited to co-deployment with SMRs or otherwise remote settings.

- Regulatory- HERL is expected to, eventually, enjoy less stringent regulatory scrutiny than SMRs due to its favorable risk profile compared to fission. However, there will be an initial regulator 'education' period of unknown duration due to HERL being a new technology.

HERL 5-Year Development Plan

Development

Current Project

- Establish core Development and Management Team
- Obtain MOUs w/ R&D Partners
- Secure Fuel & Catalysts
- Construction & Testing of Functional Prototypes
- Digital Modeling & Simulation

ELIMINATE TECHNICAL RISKS !!!

- Addit'l Testing & Modeling
- Initiate 0.1kg H_2/day Bench-Top System design
- Validate 0.1kg System
- Expand Staff & Facilities

- Initiate 1kg H_2/day Pilot System design
- Validate 1kg System
- Scale-Up Manuf. of 1kg System
- Initiate Power Design (HERL+ ICE or FC)

- Initiate 10kg System
- Validate Power System
- Scale

2026 — Pre-Seed $1M raise

2027 — Seed $8M raise

2028 — Series A $30M raise

2029 — Series B $100M raise

2030 — Series C, IPO or Acquisition

Financial

- Additional financial support available via grants within 18 months
- 27H2- Partner Revenue possible
- 29H1- Launch of 1st H_2 Generation System
- 30H2- Launch of 1st Power Generation System

All values shown are hypothetical
Dates assume closing of Pre-Seed in Q2 2026

Pre-Seed Fund Raising Details

Issuer:	HERL TECH INTERNATIONAL INC
Amount of Financing:	US$1,000,000
Type of Security:	SAFE
Valuation Cap:	US$5M PRE-Money
Discount:	20%
First $:	Initial US$250,000 under more favorable terms than above to achieve milestones 1-6 below

15-Month Milestones

1. Spin-off & register corporate entity (DE C-Corp)
2. Convert US provisional patent to PCT international patent application
3. Negotiate/Sign MOUs with nuclear research technical partners (eg DOE Labs)
4. Apply to Energy-Focused Accelerators/Incubators
5. Apply for Grants
6. Expand core Management, Staff and Advisors
7. Secure supply of test reactor fuel and radiation catalysts
8. Construction and testing of v0 HERL Reactor functional prototype

THANKS !!!

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https://herl.tech