Lattice Energy LLC

LENRs are disruptive new source of safe, radiation-free nuclear energy

Japan's NEDO industry-academia-government R&D program technically validated potential for LENRs to become major future energy source

January 2018 summary project report and other recent project reports released by Technova Inc. on ResearchGate showed reproducible Watt-level excess heat production at ~80% success rate with fabricated Pd-Ni-Zr nanocomposite LENR device materials

Herein we will discuss importance of NEDO project results to date

"Some might find this massive change to be daunting, but we look at it and see the opportunity to be a disruptor."

Mary Barra, CEO General Motors (2015)

Commenting on technological change in auto industry

Comparison of LENRs to fission and fusion

Fission, fusion, and LENRs all involve controlled release of nuclear binding energy (heat) for power generation: no CO_2 emissions; scale of energy release is MeVs (nuclear regime) > 1,000,000x energy density of chemical energy power sources

Heavy element fission: involves shattering heavy nuclei to release stored nuclear binding energy; requires massive shielding and containment structures to handle radiation; major radioactive waste clean-up issues and costs; limited sources of fuel: today, almost entirely Uranium; Thorium-based fuel cycles now under development; heavy element U-235 (fissile isotope fuel) + neutrons → complex array of lower-mass fission products (some are very long-lived radioisotopes) + energetic gamma radiation + energetic neutron radiation + heat

Fusion of light nuclei: involves smashing light nuclei together to release stored nuclear binding energy; present multi-billion $ development efforts (e.g., ITER, NIF, other Tokamaks) focusing mainly on D+T fusion reaction; requires massive shielding/containment structures to handle 14 MeV neutron radiation; minor radioactive waste clean-up $ costs vs. fission

Two key sources of fuel: Deuterium and Tritium (both are heavy isotopes of Hydrogen)

Most likely to be developed commercial fusion reaction involves the following:

D + T → He-4 (helium) + neutron + heat (total energy yield 17.6 MeV; ~14.1 MeV in neutron)

Ultralow energy neutron reactions (LENRs): distinguishing feature is neutron production via electroweak reaction; neutron capture on fuel + gamma conversion to IR + decays [β^-, α] releases nuclear binding energy; early-stage technology; no emission of energetic neutron or gamma radiation and no long-lived radioactive waste products; LENR systems would not require massive, expensive radiation shielding or containment structures → much lower $$$ cost; many possible fuels --- any element/isotope that can capture LENR neutrons; involves neutron-catalyzed transmutation of fuels into heavier stable elements; process creates heat

Executive Summary

Widom-Larsen theory provides rigorous physics that explain LENRs

- LENR phenomena have controversial history dating back nearly 100 years
- At time of most recent rediscovery (1989), milliwatt-level reproducibility of excess heat was poor and after 2-year debacle, R&D interest in LENRs waned. This occurred because: (1) there was no theoretical explanation for anomalous effects observed experimentally, especially transmutation of chemical elements; and (2) nanotech required to reproducibly fabricate Watt-level heat producing LENR devices simply did not exist at that time
- Between then and now, R&D in LENRs continued at low rates with limited funding in number of countries scattered around world, including Japan and USA. Experimentation and measurements of final reaction products with mass spectroscopy demonstrated microscopic transmutation occurs reproducibly in both Hydrogen- and Deuterium-loaded LENR systems. Reproducible production of Watt-level excess heat remained very elusive
- Key features of Widom-Larsen theory of LENRs were published in peer-reviewed *European Physical Journal C – Particles and Fields* (2006) and *Pramana – Journal of Physics* (2010). W-L successfully explains all good experimental data and observed anomalous effects, predicted new effects (confirmed), and connected LENRs directly to nanotech via plasmonics

Executive Summary

NEDO project demonstrates Watt-level reproducibility of excess heat

- Recently reported experimental results of Japanese NEDO project clearly demonstrated that a critical step in commercialization of LENRs for power generation now technically feasible: better fabrication methods for LENR device materials that can reproducibly create Watt-levels of excess heat
- Technical evaluation of summary project report dated January 2018 and related earlier project reports released by Technova Inc. on ResearchGate revealed project achieved Watt-level heat outputs for nontrivial durations with 80% or better success rate using specially fabricated nanocomposite LENR device materials comprising nano-alloys of Ni, Pd, and Zr metals. Demonstrates long-sought experimental reproducibility of excess heat but relies on spontaneous random formation of LENR active sites in materials
- Widom-Larsen theory posits that LENRs occur in microscopic nanometer to micron-sized active sites located on surfaces or at interfaces. No doubt that present levels of NEDO device performance can be further improved with better fabrication methods and yet-to-be-tested materials. However, Lattice believes vast improvements in device reproducibility and scale-up of excess heating power will require mastery of design, fabrication, and emplacement of purpose-built nanostructures that are precursors to W-L LENR active sites. Once achieved, enables scale-up to kilowatt heat output

Executive Summary

Nanotechnology can be leveraged to accelerate LENR commercialization

- Some might scoff at NEDO project's achieving only Watt-levels of excess heat, given that automotive applications would require on order of at least 60 kilowatts to successfully power full-sized motor vehicles. Skeptics would be wise to recall that world's first Uranium nuclear fission reactor, Fermi's CP-1 at University of Chicago in 1942, weighed 400 tons and only produced 0.5 Watts of excess heat; today's commercial reactors produce > 10^9 Watts. Including mass of reaction vessels, NEDO's primitive LENR reactor devices only weigh tens of kilograms and already produce more heat than did CP-1

- Unlike Uranium fission reactors, as verified by NEDO results, LENRs do not produce any deadly energetic gamma and neutron radiation or long-lived radioactive wastes. Consequently, if future commercial LENR reactors with sufficiently scaled-up power outputs can be developed they would not require heavy, expensive radiation shielding and containment systems for safe operation. That would enable LENR power systems to be vastly less expensive than fission or fusion reactors and light-enough to be utilized in unshielded propulsion systems for motor vehicles, aircraft, and spacecraft

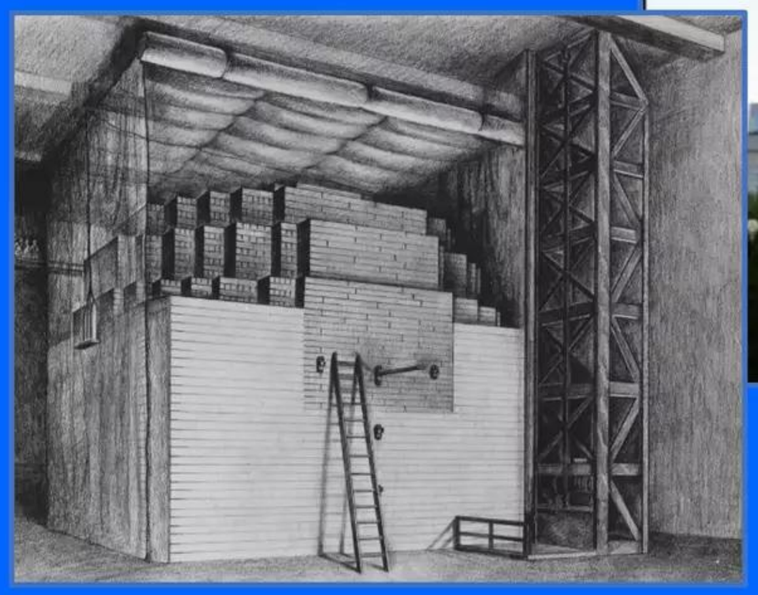
- Lattice believes that LENRs and nanotechnology are intimately interrelated. NEDO project's excellent results with nanocomposites support idea that nanotech can be leveraged to greatly accelerate LENR commercialization

Total power output of nuclear plants was scaled-up by > 10^9 x

In theory, LENR-based power systems should also scale-up enormously

5×10^{-1} Watts

World's 1st sustained fission chain reaction



Manhattan Project CP-1
USA 0.5 W 1942

5×10^{6} Watts

World's 1st grid-connected fission power plant

Obinsk
Russia 5 MW 1954

8.2×10^{9} Watts

World's largest multi-reactor fission power plant

Kashiwazaki-Kariwa
Japan 8.2 GW 2018

LENRs are green: no energetic radiation or radwastes

Lack of hard radiation obviates need for shielding and containment

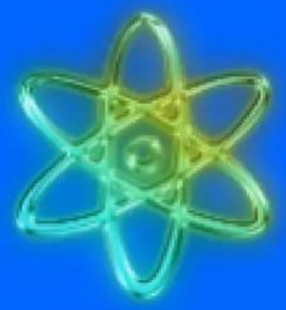
Major opportunity to develop broad range of competitive LENR power sources

Fission and fusion processes both emit deadly MeV-energy neutron and gamma radiation

Fission reactors need 1 foot of steel and 3 feet of concrete to protect human beings from dangerous hard radiation and wastes emitted by reactor; systems intrinsically large and heavy

Revolution in green nuclear technology

LENRs could enable future development of small, portable battery-like power sources that are very safe and disposable



Much larger LENR systems based on dusty plasma embodiments could potentially scale-up to megawatts

Toyota, Mitsubishi & Nissan involved in NEDO LENR project

Mitsubishi and Toyota interested in LENR technology since late 1989

TOYOTA
Let's Go Places

RENAULT NISSAN

≡ Forbes

World's Largest Automakers

≡ Forbes

5 Months 2017

	May 2017	YOY	Jan-May 2017	YOY	Est. 2017 mln.
TOYOTA	849,339	1.4%	4,375,682	6.5%	10.5
RENAULT NISSAN	897,947	12.5%	4,370,093	8.4%	10.5
Volkswagen	898,700	3.1%	4,234,900	0.1%	10.2

"World's largest automakers: Toyota, Renault-Nissan, Volkswagen neck and neck"
Bertel Schmitt in *Forbes* June 29, 2017

https://www.forbes.com/sites/bertelschmitt/2017/06/29/worlds-largest-automakers-toyota-renault-nissan-volkswagen-neck-and-neck/#45a7687a72fe

Japanese automakers working on NEDO LENR R&D project

Technova Inc. (Toyota principal shareholder) manages NEDO project

NEDO

Technova | Inc.

MITSUBISHI

TOYOTA

NISSAN

TOHOKU UNIVERSITY

NAGOYA UNIVERSITY

KOBE UNIVERSITY

KYUSHU UNIVERSITY

“Disrupt or be disrupted” - Michael Arena, General Motors

https://thefutureorganization.com/disrupt-disrupted-advice-gms-chief-talent-officer/#

https://www.linkedin.com/pulse/agility-positively-disrupt-disrupted-michael-arena-phd/

NEDO project reports reproducible Watt-level excess heat

"Excess power of 3 - 10 W lasting for a few weeks at … 200 - 300° C"

Presentation | File available

ResearchGate

Effect of Supporter Material on Heat Evolution from Ni-based Nano-Composite Samples under Exposure to Hydrogen Isotope Gas

Download

June 2017

DOI · 10.13140/RG.2.2.36435.37924

Conference: 12th International Workshop on Anomalies in Hydrogen Loaded Metals · At: Costigliole d'Asti, Italy · Affiliation: ISCMNS

Projects · Leading the Japanese Gvt NEDO project on anomalous heat effect of nano-metal and hydrogen gas interaction

Akira Kitamura · Akito Takahashi · Koh Takahashi · Show all 17 authors · Hideki Matsune

Results From Slide #3

- Excess power at elevated temperatures around 300 °C observed only for binary-metal nanoparticle samples
- Excess power of 3 ~ 10 W lasting for a few weeks at elevated temperatures 200 ~ 300 °C, to result in integrated heat-energy of 20 MJ/mol-Ni, or 90 MJ/mol-H
- Unexplainable by any known chemical reaction

https://www.researchgate.net/publication/317339283_Effect_of_Supporter_Material_on_Heat_Evolution_from_Ni-based_Nano-Composite_Samples_under_Exposure_to_Hydrogen_Isotope_Gas

NEDO project reports reproducible Watt-level excess heat

"Result in integrated heat-energy of 20 MJ/mol-Ni, or 90 MJ/mol-H"

Effect of Supporter Material on Heat Evolution from Ni-based Nano-Composite Samples under Exposure to Hydrogen Isotope Gas

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https://www.researchgate.net/publication/317339283_Effect_of_Supporter_Material_on_Heat_Evolution_from_Ni-based_Nano-Composite_Samples_under_Exposure_to_Hydrogen_Isotope_Gas

NEDO project reports reproducible Watt-level excess heat

"Result in integrated heat-energy of 20 MJ/mol-Ni, or 90 MJ/mol-H"

Heat evolution from silica-supported nano-composite samples under exposure to hydrogen isotope gas

Table 1. Specifications of the samples tested.

	Silica-coated Pd nanoparticle; PSf1		Mesoporous-silica-supported CuNi nanoparticle; CNS3		Mesoporous-silica-supported CuNi; CNS2 (for reference)	
Particle size	20.8 nm (average)		10 ~ 100 nm		5 ~ 20 nm	
Fabricated at;	Kyushu Univ.		Technova-Kobe U.		Technova-Kobe U.	
Tested on;	Sept. – Nov. 2016		Nov. 2016 – Feb. 2017		Aug. – Oct. 2014	
	Mass (g)	Number of moles	Mass (g)	Number of moles	Mass (g)	Number of moles
Amount	115.37	---	150.50	---	160.33	---
O	1.27	0.079	3.40	0.21	3.76	0.24
Ni	---	---	11.36	0.19	12.07	0.21
Cu	---	---	1.22	0.02	1.89	0.03
Pd	8.42	0.079	---	---	---	---
Zr	---	---	---	---	---	---
SiO_2	105.68	1.76	134.52	2.24	146.38	2.44

CNS3 #2 run: " excess heat amounts to 200 eV/Ni (20 MJ/mol) or more than 0.9 keV/H (90 MJ/mol-H) without detectable dose rate of hard radiations, which cannot be explained by any chemical process."

https://www.researchgate.net/publication/320741361_Heat_evolution_from_silica-supported_nano-composite_samples_under_exposure_to_hydrogen_isotope_gas

NEDO project reports reproducible Watt-level excess heat

In this summary of some (not all) experiments reproducibility is > 80 %

Supplement

Summary of the results in the past 3 years

Sample ID	(Ni or Pd) content	H (D or H)	RT						ET (> 250°C)								Remarks			
			L_M		$E_t \equiv \int W\,dt$		η_{av}		L_M		W		η_{av}		$E_{ex} \equiv \int W\,dt / L_M$		RC	ref	α	
	(g)				(kJ/m-M)		(eV/H)				(W)		(keV/H)		(MJ/m-H)		old /new	fitting func	variable	
(NEDO)			#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2	#1	#2				
PNZt	6.4	D(H)	(1.1)	2.2	220	81	(2.1)	0.39	1.5	0.15	5.9	2.6	(0.29)	0.77	(7.8)	4.3	o			leak
PNZ3	20.0	D	3.4	1.6	200	62	0.61	0.43	2.8	1.1	8.0	10	6.5	16	3.7	5.7	o			RTDav
PNZ3r	18.8	H	0.11	(5.3)	6.0	0	0.62	0	2.1	(7.4	8.0	---	0.19	---	2.0	---	o			RTDav,leak reoxid. 200 h
PNZ4	23.0	D	3.5	1.8	180	73	0.56	0.43	3.1	1.1	---	4.5	---	4.4	---	3.0	o		v	malf. (#1)
PNZ5	41.1	D	3.5	1.1	210	43	0.63	0.4	3.1	0.55	3.5	4.2	0.4	1.3	1.1	7.6		f	v	
PNZ5r	40.7	D	0.32	0.085	16	1.4	0.53	0.17	0.7	0.2	3.7	4.5	0.025	1.0	2.5	9.0		f	v	reoxid. 100 h
CNZt	9.1	H(D)	0.19	0.19	6.7	3.7	0.37	0.2	1.7	0.2	4.0	2.2	1.7	0.83	11	150	o			
CNZ5	22.0	H	0.2	==	9.8	==	0.5	==	1.9	==	3.3	==	3.4	==	3.6	==	o		v	RTDav
CNS2	12.1	H	0.01	==	0	==	0	==	1.1	0.15	11	7.2	11	20	23	190	o			
CNS3	11.4	H	0.03	0.02	1.5	1.5	0.57	0.65	0.8	0.16	2.4	4.4	1.4	4.7	6.0	90		f	v	
PSf1	8.4	D	2.6	1.6	130	29	0.51	0.19	1.6	0.7	< 1	< 2.2	0	0	0			f	v	

IWAHLM12 (5-9 Jun. 2017) Technova Inc. Technova-5702-NK-37 23

Supplement

https://www.researchgate.net/publication/317339283_Effect_of_Supporter_Material_on_Heat_Evolution_from_Ni-based_Nano-Composite_Samples_under_Exposure_to_Hydrogen_Isotope_Gas

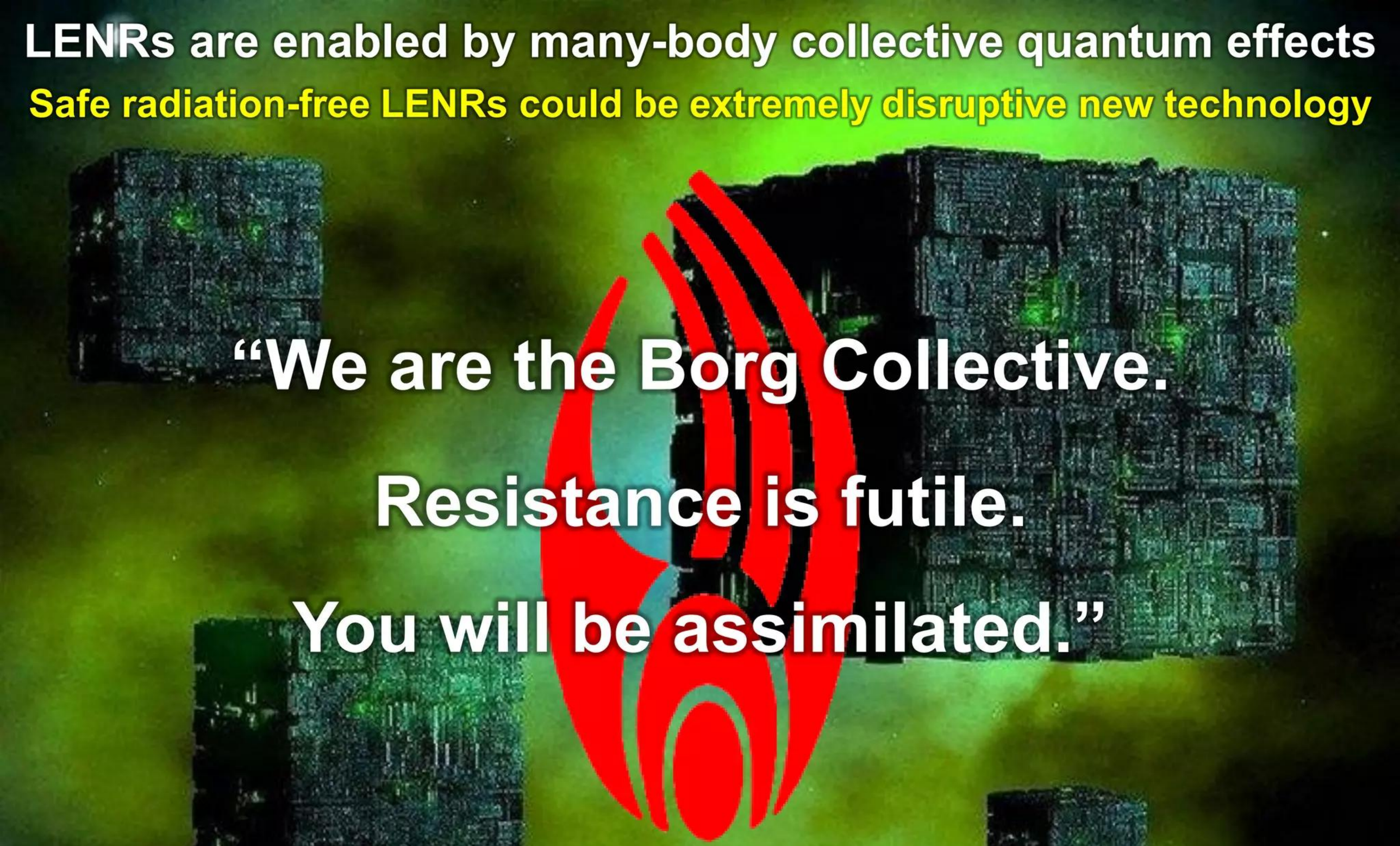
NEDO project reports reproducible Watt-level excess heat

Watt-level heating produced without emitting any deadly hard radiation

- Excess heat was produced in ~ 80% of experiments; whenever excess heat is created, it is most often at Watt-levels or better at operating temperatures of 200 - 300º C. Duration of excess heat production ranged up to weeks, which is non-trivial. Such LENR device behavior represents excellent reproducibility for complex early-stage technology; are best-ever results reported to date in field
- Watt-level excess heat is produced in Hydrogen (H)- and Deuterium (D)-loaded systems. This is consistent with & predicted by Widom-Larsen theory of LENRs
- No deadly energetic (MeV-energy) gamma or neutron radiation was detected during Watt-level excess heat production during any project experimental runs. Observations are consistent with & predicted by Widom-Larsen LENR theory
- Substantial variation in heat production between duplicate samples under otherwise similar conditions is likely due to subtle nanoscale heterogeneities
- In Lattice's opinion, NEDO project's outstanding experimental results change LENRs' Technology Readiness Level (TRL) from TRL-3 to TRL-4 (European Commission definitions). This is important step for commercialization efforts
- Lattice recently discovered surprisingly deep causal connections between condensed matter electroweak nuclear catalysis (e + p reaction), enzymatic catalysis, and chemical catalysis --- LENRs are not as exotic as some may think

LENRs are enabled by many-body collective quantum effects

Safe radiation-free LENRs could be extremely disruptive new technology



The Borg are a fictional group of cybernetic alien beings that appear as existential threats in the S*tar Trek* universe. Their ultimate goal is "achieving perfection."

Nuclear energy density surpasses any chemical technology

LENR-based power generation could have vast competitive advantage

Future possibility of converting Carbon aromatics to CO_2-free LENR fuels

LENRs Versus Chemical Energy Sources: Batteries, Fuel Cells, and Microgenerators	
Source of Energy	**Approximate Energy Density (Watt*hours/kg)**
Alkaline Battery	**164**
Lithium Battery	**329**
Zinc-Air Battery	**460**
Direct Methanol Fuel Cell (35% efficient)	**1,680**
Gas Burning Microgenerator (20% efficient)	**2,300**
100% Efficient Combustion of Pure Methanol	**5,930**
100% Efficient Combustion of Pure Gasoline	**11,500**
LENRs (based on an assumption of an average of 0.5 MeV per nuclear reaction in an LENR system)	**57,500,000** (maximum theoretical energy density – only a fraction would be achievable in practice)

Chemical

LENRs

~2,000 Wh/kg might someday be practical with Lithium-air batteries

~11,680 Wh/kg is theoretical maximum with Lithium-air

Nanoparticulate LENR fuels could be used in many systems

Huge energy density advantages vs. fossil fuels & chemical batteries

Green LENR fuels energy densities could be 5,000x larger vs. gasoline

Consequences: an automobile powered by LENRs could travel around the entire world on a quantity of nanoparticulate fuel that fits into a medium-size FedEx box. **Unlike fission and fusion, LENRs scale downward.** This enables future development of portable LENR power systems that could compete directly with batteries and fuel cells, thus vastly expanding range of markets

LENR fuels would be inert and benign and could use existing package delivery systems for resupply; typical gasoline or diesel tanker truck carries ~5,000 - 12,000 US Gallons of liquid fuel; **LENR fuels producing same # of BTUs could be shipped in 1 - 2 FedEx boxes**

LENRs could vastly increase performance for many products

Energy densities of LENR fuels 5,000x larger than chemical processes

LENR systems should be able to achieve 10x - 100x chemical power density

Enhancements in product range/endurance if LENR technology is commercialized

	Product Name	Present capabilities with today's power sources Range (endurance)	Vastly enhanced capabilities with future LENR-based power sources	
			10x chemical	100x chemical
Various aircraft	GreenWing e430	180 miles (~3 hours @ 60 mph)	1,800 (30)	18,000 (300)
	Airbus E-Fan 2.0	99 miles (1 hour @ 99 mph)	990 (10)	9,900 (100)
	Predator MQ-1	1,800 miles (24 hours @ 75 mph)	18,000 (240)	180,000 (2,400)
	Super Heron	est. ~4,000 miles (45 hours @ 89 mph?)	40,000 (450+)	400,000 (4,500)
	Springtail	184 miles (2.2+ hours @ 94 mph)	1,840 (200+)	18,400 (2,000+)
	Crazyflie	Speed not measured (3 - 10 minutes)	? (30 - 100 min.)	? (maybe 5 - 17 hrs.)
	InstantEye	est. ~8 miles (18 - 20 min @ 25 mph)	est. 80 (3.2 hrs.)	800 (32 hrs.)
	Tesla Model S car	~300 miles (4 - 5 hours @ 70 mph)	3,000 (40 - 50)	30,000 (400 - 500)
	Shkval torpedo	6.8 - 9.3 miles (1.8 - 2.4 min @230 mph)	68 - 93 (18 - 24 min)	680 - 930 (3 - 4 hrs)
	Exoskeletons and autonomous robots	Require tether cables connected to some type of external power source	Duration of autonomous activity might be extended up to weeks or even months	

https://www.slideshare.net/lewisglarsen/lattice-energy-llc-revolutionary-lenrs-could-power-future-aircraft-and-other-systems-feb-16-2014

LENRs could greatly disrupt today's global energy system

5 -10 kwh LENR powergen systems would be revolutionary development

Systems with megawatt power outputs not required for energy revolution to occur

- At system electric power outputs of just 5 - 10 kwh, modular LENR-based distributed power generation systems providing combined heat and electricity (CHP) could satisfy energy requirements of majority of urban and rural households as well as smaller business customers worldwide
- At electric power outputs of 60 - 200 kwh, LENR-based systems would be able to power electric or hybrid vehicles, breaking oil's stranglehold on transportation; provide high-quality heat for many industrial processes
- Although they could very likely be designed and built, megawatt LENR systems are not mandatory to disrupt the world of energy for the better
- If wide deployment of small-scale LENR distributed generation could be achieved, large numbers of fossil-fired and/or fission power plants would not have to be built to supply competitively priced electricity to regional grids serving urban areas. Under that scenario, centralized grid power generation could then be gradually displaced by vast numbers of smaller, lower-cost distributed power systems located at homes and businesses

Widom-Larsen enables commercialization of LENRs

Applied nanotechnology and LENRs are mutually joined at the hip

Development risks can be reasonable thanks to Widom-Larsen and nanotech

Guided by physics of the Widom-Larsen theory, an opportunity to commercialize LENRs as truly green CO_2-free nuclear energy source has been enabled by a unique juxtaposition of very recent parallel advances in certain very vibrant areas of nanotechnology (esp. plasmonics), quantum entanglement, new innovations in nanoparticle fabrication techniques, as well as an array of new discoveries in advanced materials science.

Simulation of high local electric fields associated with surface plasmon electrons on substrate

Key conclusions of theoretical paper published in Pramana

Journal is peer-reviewed publication of Indian Academy of Sciences

"A primer for electro-weak induced low energy nuclear reactions"
Y. Srivastava, A. Widom, and L. Larsen in *Pramana* (2010)

"The analysis presented in this paper leads us to conclude that realistic possibilities exist for designing LENR devices capable of producing 'green energy', that is, production of excess heat at low cost without lethal nuclear waste, dangerous γ-rays or unwanted neutrons. The necessary tools and the essential theoretical know-how to manufacture such devices appear to be well within the reach of the technology available now. Vigorous efforts must now be made to develop such devices whose functionality requires all three interactions of the Standard Model acting in concert."

Documents about LENRs and Widom-Larsen theory

Purplish hyperlinks below are 'live' as well as in SlideShare PowerPoints

"January 2018: project report released - summarized progress in Japanese government-funded NEDO R&D in LENRs for Oct. 2015 thru Oct. 2017. Project scientists reported good progress in developing nanocomposite LENR devices for use as powerful heat sources"

https://www.slideshare.net/lewisglarsen/lattice-energy-llc-japanese-nedo-lenr-project-reported-good-progress-in-excess-heat-production-and-device-fabrication-jan-27-2018

"Scalability of LENR power generation systems"

http://www.slideshare.net/lewisglarsen/lattice-energy-llc-scalability-of-lenr-power-generation-systems-nov-29-2015

"Japanese confirm importance of high electric fields and mobile protons in chemical catalysis"

https://www.slideshare.net/lewisglarsen/lattice-energy-llc-japanese-confirm-lattice-hypotheses-re-importance-of-adsorbed-protons-and-high-local-electric-fields-in-chemical-catalysis-june-27-2017

"LENR technology's compelling value proposition for oil & gas companies"
Aromatics in oil convert to CO_2-free LENR fuels w. 5,000x > heat vs. gasoline

https://www.slideshare.net/lewisglarsen/lattice-energy-llc-lenr-technologys-compelling-value-proposition-for-oil-and-gas-companies-april-12-2017

Key publications about Widom-Larsen theory of LENRs

"Ultra low momentum neutron catalyzed nuclear reactions on metallic hydride surfaces"
A. Widom and L. Larsen (author's copy)
European Physical Journal C - Particles and Fields 46 pp. 107 - 112 (2006)
http://www.slideshare.net/lewisglarsen/widom-and-larsen-ulm-neutron-catalyzed-lenrs-on-metallic-hydride-surfacesepjc-march-2006

"A primer for electro-weak induced low energy nuclear reactions"
Y. Srivastava, A. Widom, and L. Larsen (author's copy)
Pramana - Journal of Physics 75 pp. 617 - 637 (March 2010)
http://www.slideshare.net/lewisglarsen/srivastava-widom-and-larsenprimer-for-electroweak-induced-low-energy-nuclear-reactionspramana-oct-2010

"Theoretical Standard Model rates of proton to neutron conversions near metallic hydride surfaces"
A. Widom and L. Larsen
Cornell physics preprint arXiv:nucl-th/0608059v2 12 pages (2007)
http://arxiv.org/pdf/nucl-th/0608059v2.pdf

"Hacking the Atom" (Volume 1 - 484 pages) popular science book
Steven B. Krivit, Pacific Oaks Press, San Rafael, CA, September 11, 2016
Paperback US$16.00; hardcover US$48.00; Kindle US$3.99
https://www.amazon.com/dp/0996886451

Working with Lattice Energy LLC, Chicago, Illinois USA

Partnering on LENR commercialization and consulting on other subjects

1-312-861-0115 lewisglarsen@gmail.com

L. Larsen c.v.: http://www.slideshare.net/lewisglarsen/lewis-g-larsen-cv-june-2013

- We believe Lattice is the world-leader in proprietary knowledge about LENR device engineering required to develop high-performance, long lived, scalable power sources. Our published peer-reviewed theoretical papers rigorously explain the breakthrough device physics of LENR processes, including the absence of dangerous energetic neutron or gamma radiation and lack of long-lived radioactive waste production
- Lattice welcomes inquiries from large, established organizations that have an interest in discussing the possibility of becoming Lattice's strategic capital and/or technology development partner
- Lewis Larsen also independently engages in consulting on variety of subject areas that include: Lithium-ion battery safety issues; long-term electricity grid reliability and resilience; and evaluating potential future impact of LENRs from a long-term investment risk management perspective for large CAPEX projects in the oil & gas, petrochemicals, transportation, utility, and aerospace industries

Dinosaurs dominated Earth's landscape for 160 million years

Toppled by catastrophic combination of impactor and volcanic eruptions

Combustion of fossil Carbon fuels --- starting with wood and more recently with coal and oil --- has dominated mankind's energy consumption since the discovery of fire some 350,000 years ago. These energy sources now threatened by resource depletion within 150 years as well as possibility of end-use-restriction stemming from efforts to reduce global human-related CO_2 emissions that might be accelerating what data suggests may be progressive global warming.

New Age of democratized access to low-cost, CO_2-free LENR energy could enable high rates of sustainable global economic growth and create universal prosperity

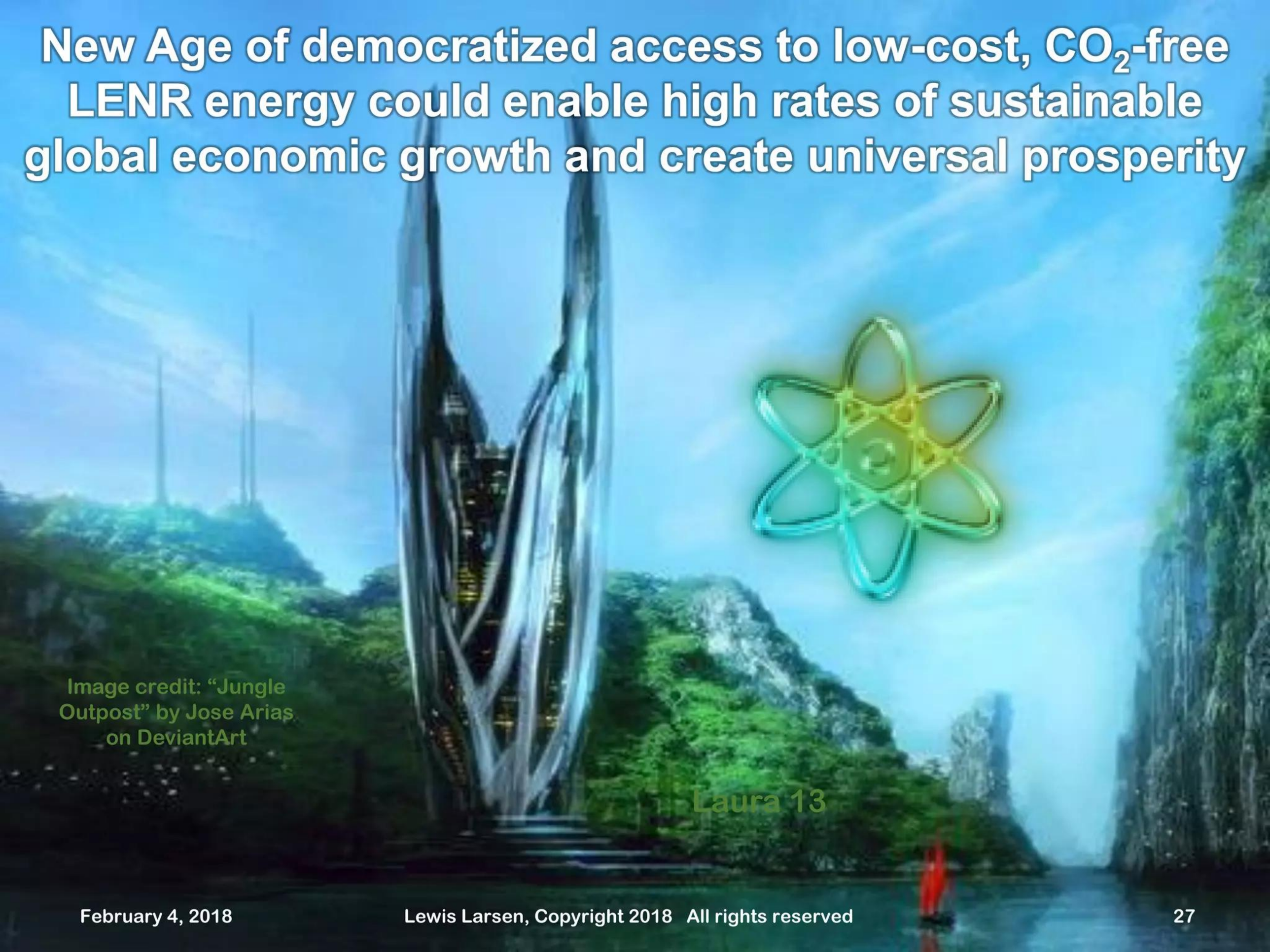


Image credit: "Jungle Outpost" by Jose Arias on DeviantArt

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