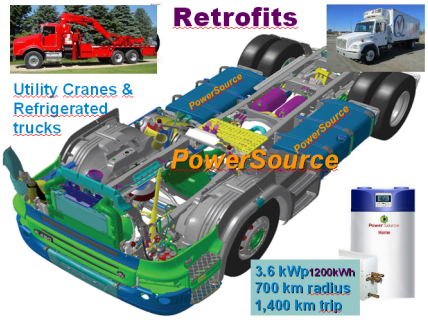
Red Sun Power Block
Featuring 120 MWh Red Sun Mobile

Executive Study
Jay Dubinsky, CEO Nuclear Eng.
Alex Paurom ~Lawyer
Dan Winter EE ~ Plasma & H2 Eng.
Jack Wong~Hydrogen Reactor Eng
Andrejs Zagars Formulary Chemist



Redstar Energime Green Group
Www.redstaregg.com

Small Modular Reactor Revolutionizing Energy, Manufacturing, and Supply Chains with Enhanced Efficiency, Safety, and Cost Savings

The small modular reactor (SMR) market is expected to surge from $159.4 million in 2024 to $5.17 billion by 2035, propelled by a 42.31% CAGR. This growth is driven by increased adoption of modular nuclear technology, which offers factory fabrication, standardization, and modular deployment

advantages. As global energy demands shift towards low-carbon sources, and 15 x's demand for energy gfor data ceners'

https://www.datacenterdynamics.com/en/news/brookfield-next-decade-will-see-75gw-of-ai-data-centers-built-total-ai-infrastructure-spend-to-pass-7-trillion/

As demand for SMRs rises, especially for remote areas and industrial facilities. Leaders like ROSATOM, NuScale Power, and Westinghouse are enhancing reactor design and digital integration, contributing to this expansion. The market's focus on reducing greenhouse gases and improving efficiency underscores its role in sustainable power solutions..

The small modular reactor market was valued at $159.4 million in 2024 and is projected to grow at a CAGR of 42.31%, reaching $5.17 billion by 2035

The increasing adoption of modular nuclear reactor technology, including factory fabrication, standardization, and modular deployment, is driving this market growth. As the energy sector transitions to low-carbon and resilient power sources, demand for SMRs that can serve remote sites and industrial facilities and supplement existing grids is expected to rise.

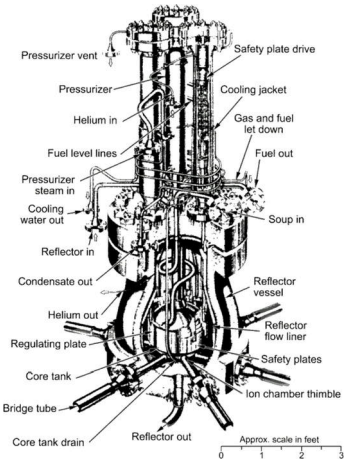
Additionally, the growing focus on reducing greenhouse gas emissions, improving safety performance, and shortening project timelines are contributing factors. Recent progress in advanced reactor designs, digital system integration, and manufacturing efficiencies has positioned the SMR market for significant expansion in the coming decade.

North America is expected to lead the small modular reactor (SMR) market, supported by robust regulatory frameworks, technological advancements, and strategic investments in advanced nuclear projects. The U.S. Department of Energy and Canadian Nuclear Laboratories have sponsored SMR research, demonstration projects, and streamlined licensing initiatives. Strong public-private partnerships, federal funding programs, and growing interest in SMR applications for grid resilience and process heat are driving regional growth.

North America's focus on reducing greenhouse gas emissions, enhancing energy security, and modernizing power infrastructure positions it as the leading region for SMR deployment, setting the stage for a low-carbon energy future.

Market Introduction

The SMR market is experiencing significant growth as the energy sector transitions to low-carbon power solutions and strengthens energy resilience. This market is driven by the adoption of modular reactor technology, standardization, and factory fabrication, which reduce capital expenditures and accelerate project schedules.



Aqueous Homogeneous Reactors

(AHR) is a two (2) chamber reactor consisting of an interior reactor chamber and an outside cooling and moderating jacket chamber. They are a type of nuclear reactor in which soluble nuclear salts (usually uranium sulfate or uranium nitrate) are dissolved in water. The fuel is mixed with heavy or light water which partially moderates and cools the reactor. The outside layer of the reactor has more water which also partially cools and acts as a moderator. The water can be either heavy water or ordinary (light) water, which slows neutrons and helps facilitate a stable reaction, both of which need to be very pure.

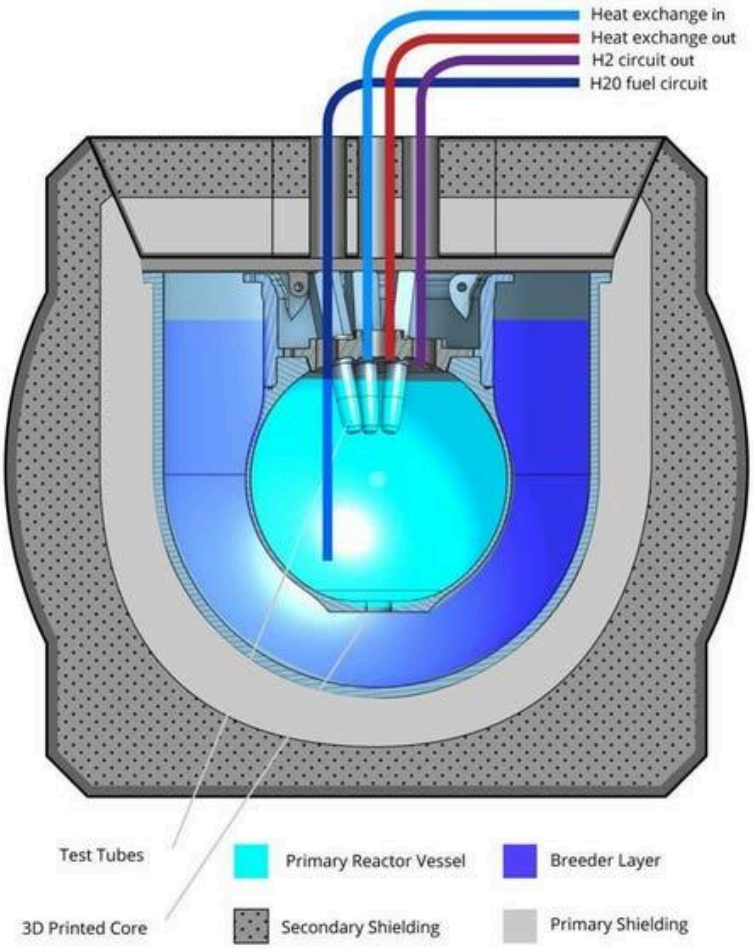
Above- Aqueous homogeneous reactor at Oak Ridge National Laboratory (ORNL)

Their self-controlling features and ability to handle very large increases in reactivity make them unique among reactors, and possibly safest. At Santa Susana, California, Atomics International performed a series of tests titled The Kinetic Energy Experiments. In the late 1940s, control rods were loaded on springs and then flung out of the reactor in milliseconds. Reactor power shot up from ~100 watts to over ~1,000,000 watts with no problems observed.

Aqueous homogeneous reactors were sometimes called "water boilers" (not to be confused with boiling water reactors), as the water inside appears to boil, though the bubbling is actually due to the production of hydrogen and oxygen as radiation and fission particles dissociate the water into its constituent gases, a process called radiolysis. AHRs were widely used as research reactors as they are self-controlling, have very high neutron fluxes, and were easy to manage. As of April 2006, only five AHRs were operating according to the Research Reactor database.

Corrosion problems associated with sulfate base solutions limited their application as breeders of uranium-233 fuels from thorium. Current designs use nitric acid base solutions (e.g. uranyl nitrate) eliminating most of these problems in stainless steels.

5.55 MW Red Sun Power Block
EXECUTIVE STUDY & Am241/Po211 Radioisotope production 16 gm/day



Above - Redstar Patent- Pending Redesign of AHR

Energy Comparison With Fossil Fuels*:*

With a complete combustion or fission, approx. 8 kWh of heat can be generated from 1 kg of coal, approx. 1 kWh from 1 kg of mineral oil and around 24,000,000 kWh from 1 kg of uranium-235. Related to one kilogram, uranium-235 contains two to three million times the energy equivalent of oil or coal. The illustration shows how much coal, oil or natural uranium is required for a certain quantity of electricity. Thus, 1 kg natural uranium– following a corresponding enrichment and used for power generation in light water reactors – corresponds to nearly 10,000 kg of mineral oil or 14,000 kg of coal and enables the generation of 45,000 kWh of electricity. One tiny fuel pellet can contain the equivalent usable energy of 3 barrels of oil! Returning to nuclear power is the only thing that makes sense for Italy (and Germany, Spain, Latvia, Thailand, Philippines, etc.), the EU and Asia with oil at $74/ barrel and today's limited 18th Century energy technology the only other choice.

Nine years ago, Indonesia produced just 5% of the nickel according to *Benchmark Intelligence*. By 2023, it accounted for half the global copper output, with forecasts for 65% of global output by the end

of the decade. And; the Philippines is second in copper reserves globally, with a huge upside potential once smelters and refineries are built. What is holding the PhilippInes back are sky- high utility and gas/ fuel bills, which Redstar Nuclear Power Plants will greatly lower producing AHRs and MSRs for charging batteries and electricity and heat costs to $40/MWh, the Philippines can be a major player in copper and nickel, including the new Aqueous Homogeneous Reactors that make 220 liters of H2 per minute to reduce copper and nickel concentrates in flash smelters perfected by *Outokamku* in Finland in 1949 and reintroduced by China for green steel last year. Redstar will build Cu Smelter in 2025 for 250 kt copper matte per year featuring the AHR and Red Sun thermal battery while cutting energy costs in half and hydrogen costs by. 90%.

Thus, Redstar's marriage of Smelting with Molten Salt Reactors (and SMRs) and Transforming 1850°C Red Sun thermal batteries bring pink hydrogen into metal business for the 1st time to make green copper & green nickel matte.

***Introducing the Aqueous**. **HOMOGENEOUS REACTOR** (AHR):*

The 112 kW AHR is operated on 20 x 1kg Uranium pellets of 8% U235, can be easily manufactured and current designs use 3- D printers, with novel patent- pending fluoropolymers that are neutron and strong acid- proof. Easily built up to 1 MW upto 500 MW, although current starting model is 112 kW, puts out 22 liters H2 per minute and produces heat of 320°C to run standard steam and Ammonia engines, and is as big as a beachball. Financially, AHR is. A breakthrough hit, as it makes up to 32 gm per day of Am241 and Po208- 209- and 210 per day. The reactor and blanket have a neutron flux of 2 quadrillion neutrons per cm2 per second (@0.05), which is high. Thus, AHR is a super- light water moderated reactor of spherical design, good for Th234 blanket to transmute to U233(Pa234); and, perfect for production of much in demand radioisotopes Mo99, Am251 and Po 208 209 and 210 that sell at up to $2000 per gram. With LOI and next month full contract for $1500gm with *Stargen* for 1000 kg of material by 2030.

Red Sun Power Block - 5.55 MW:

- 6 MW -120 MWh Red Sun thermal battery charged by 4 x AHR + 3 Opra H2 Turbines 1.85 ea= 5.55 MW recharges at 28c/kg H2 = 3.1 c/kWh

Aqueous Homogeneous Reactor:

Featuring the most cost-efficient Biohydrogen on Earth: the Aqueous Homogeneous Reactor (AHR) above with Tesla turbine or Opra Op16 1.85 MW turbine (see pic below) with 6 MW Red Sun mobile thermal battery will run any ship train or industry on biohydrogen. Featuring the first mobile thermal battery at 120 MWh for 6 MW Red Sun / *Powersource* is heart and workhorse of *5.55 MW Red Sun Power Block* putting- out 120 MWh per charge (2 hours) thermal at 1850°C and weighs 6.5 tons and 5.5 m3 and recharges at $40/MWh LCÒE with exclusive fission hydrogen. The mobile 0.33 to 32 MW battery outer ceramic heat casing layers like the *Space Shuttle* goes to 2,000°C to 2500°C. This retention casing is designed by *Thyssenkrupp,* for 2,000°C Ni-Fe alloy and 6 MW charges in 2 hours and has been successfully tested with *GE*, *VW*, *Cummins*, *Porsche*, *Isuzu*, *Kawasaki*, *Rolls Royce*, *Pratt and Whitney*, *Man*, *Kawasaki*, *and Siemens turbines*; successfully testing 2.5 MWe turbines; Red Sun runs up to 52 MW *Siemens SGT- steam generator set*. Red Sun lasts 50 years in *5.55 MW Power Block* insured by *Lloyd's Insurance*. Plus, *Pink Hydrogen* at 28c/kg = 3.1 US cents/kW plus labor = $40/MWh.

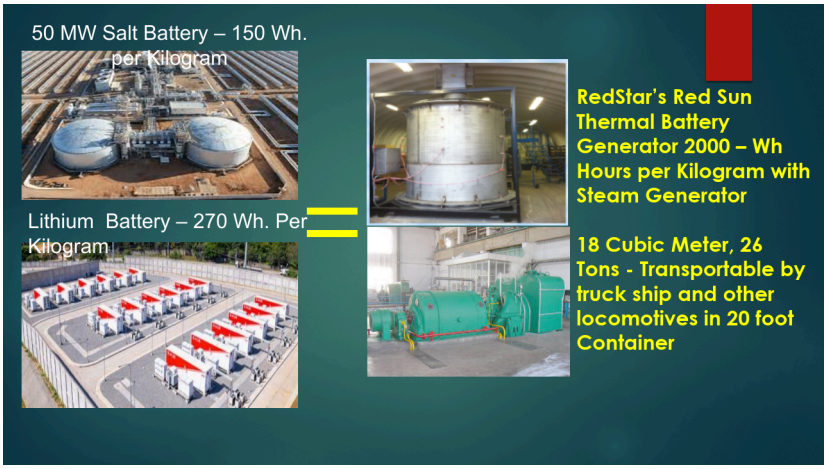
On the sea and hauling freight you need cost- efficiency and maximum horsepower and *Red Sun cryo nitrogen* delivers both at 3.5 x's the torque of current diesel. Forty x's less: hydrogen under *IMO* is 195 bar (25°C) maximum for marine hydrogen *compression limit,* which only gives 0.5 kWh/L vs. *Red Sun cryo nitrogen* at 20 kWh/L (at 200°C) - 40 x's more!

Red Sun Nuclear Charger- AHR

Putting out 88 L/min hydrogen run 3 x *Opra Op 16* (or *Cummins* or *JCB* H2 generator) by hydrogen by *Aqueous* Homogeneous Reactor - AHR x 4 gives 88 L//min to run 3 x *Opra Op 16 5.55* MW turbines + 6 MW Red Sun 5.55 MW *Power Block* 8500 hr/yr x 120/MWh = $3.68M/year electricity & $11.2 M/year from 5600 gm/year radioisotopes with 8 mo. pay-off.

Example: 5.55 MW x 8500 hr/yr x $120/ MWh x 65% eff. = $3.68 M/ year

Rockwool 5.55 MW Power/ Heat Block Total Cap Cost - $6.25 M
Red Sun Battery - $400k
3 x Opra OP16 - $4.1M
4 x AHR reactor - $1.5 M
Carbon fiber *Heatex* - $100k
Labor overhead & team $150k
Lease payments $248k/yr 48 mo lease 20% down = $1.25 M
Lloyd's Syndicate Insurance
Electricity Gross Inc before - $14.8M
Elec After expenses $2.28 M/ yr
16 gm/d x 350 d/yr x $2000/ gm Am 241, Mo 99, Po 211 = $11.2 M
Isotopes after expenses = $8.2
Total after expenses = $10.48 M/ yr



Return On Investment*:- *ROI

ROI = $10.48 M/$6.25 M = 168%

There is a gold mine retrofitting ships with Red Sun and AHR with existing diesels onboard in the 5.5 MW Power Block. The Php Admiral complained they go through P 11,000,000 per day per ship! Red Sun would save them P5,500,000 per day (~$64k USD/day and cost $5.5 M for 5.55 MW with 6 MW Red Sun).

73.61	-0.22%
77.29	-0.26%

- SMR technology is rapidly advancing, with numerous designs in development and several companies planning to deploy reactors within the next decade.
- SMRs offer a smaller, cheaper, and faster alternative to conventional nuclear reactors, making them suitable for a wider range of applications and locations.
- The growing demand for clean energy, particularly from data centers, is driving significant investment and innovation in SMR technology.
- https://www.datacenterknowledge.com/energy-power-supply/nuclear-powered-data-centers-when-will-smrs-finally-take-off-

Small modular reactor (SMR) technology has improved immensely in recent years, as several nuclear power companies around the globe aim to launch small-scale nuclear projects to provide clean energy within the next decade.

SMRs are advanced nuclear reactors with a power capacity of up to 300 MW(e) per unit, equivalent to about one-third the generating capacity of a conventional nuclear reactor. SMRs are much smaller than traditional reactors and are modular, making it easier to assemble them in factories and transport them to the site. Because of their smaller size, SMRs can be installed on sites that are not suitable for conventional reactors. They are also significantly cheaper and faster to build than traditional nuclear reactors and can be constructed incrementally. The SMR market is expected to grow from $6 billion in 2024 to $7.14 billion in 2030, growing at a CAGR of 3 percent. The Asia Pacific and Americas markets will likely be the main drivers of this growth.

In the U.S., an increasing number of tech companies are investing in SMR technology with the hopes of powering their high-energy-demand data centers with clean energy. The sector hopes SMR technology will be available to power several data centers by the 2030s, as their power demand grows in line with the rollout of artificial intelligence and other complex technologies. This has led Google to order seven SMRs, and Amazon, Microsoft, and Meta to follow suit.

The growing demand for clean energy is encouraging conventional nuclear power companies and various startups to invest heavily in the development of SMR technology. There are over 90 separate designs for SMRs worldwide, many of which are backed by governments. However, many of these designs are in the initial phases of development and have not yet been tested for functionality. In the U.K., the government is backing the development of SMR technology. In December, the former national security adviser Stephen Lovegrove was appointed chair of the board of the Rolls-Royce-led consortium developing SMRs. Lovegrove said that Rolls-Royce is around 18 months ahead of the competition in developing SMR technology. In the Netherlands, the Nuclear Startup Thorizon announced a new consortium to develop a molten salt SMR. Thorizon has partnered with Dutch companies Demcon and VDL Group to set up an advanced testing facility to accelerate SMR technology development. The firm is currently building a 100-MW molten salt reactor, Thorizon One, which it hopes to get running in a pilot plant by the mid-2030s. It expects the first prototype to be fuelled by a mix of long-lived radioactive waste from existing nuclear facilities and thorium. This will transform much of the long-lived waste into short-lived waste.

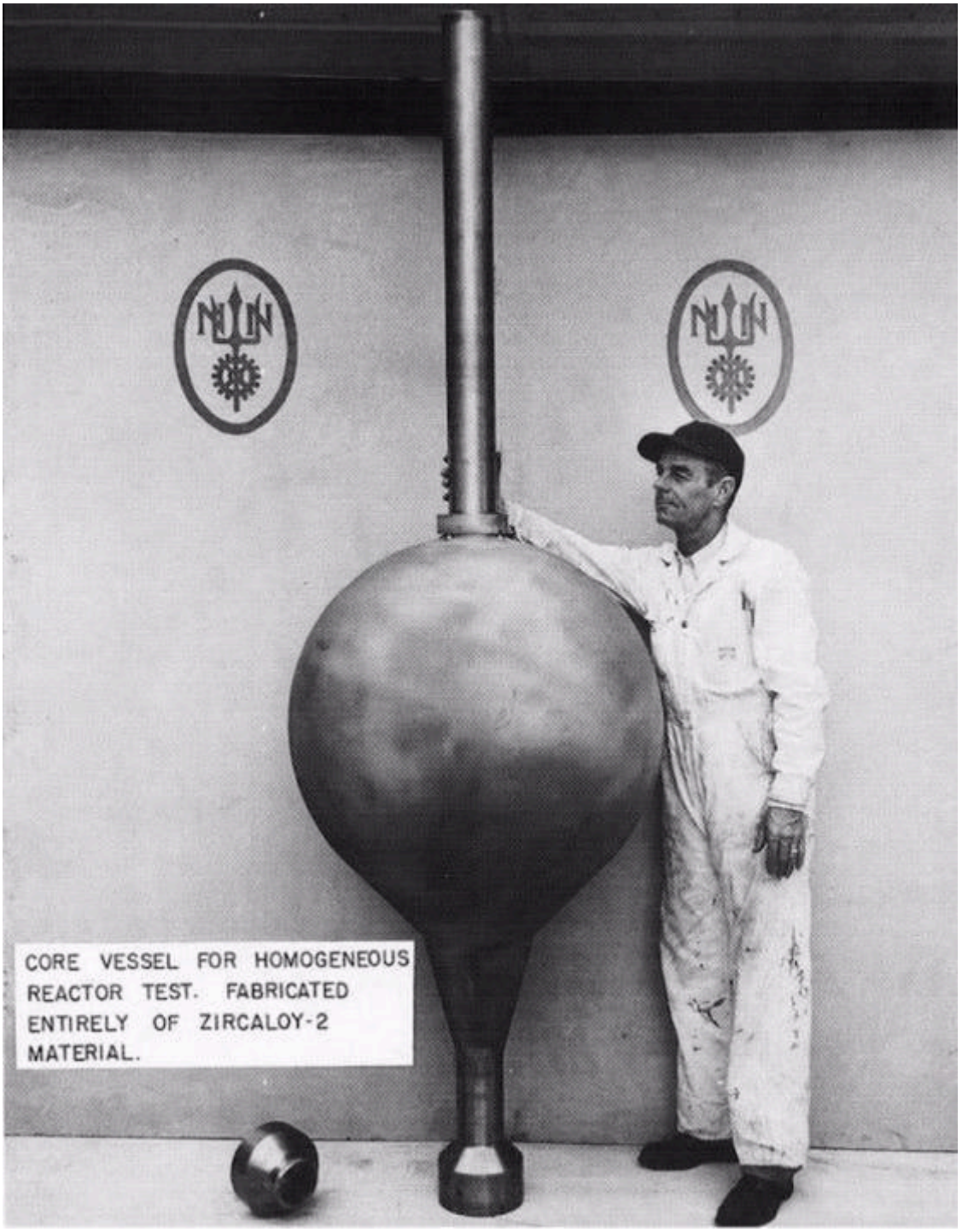
Molten salt reactors are powered by a radioactive solution that blends fissionable isotopes with a liquid salt. While they can be powered using uranium, they run optimally on thorium, a cleaner, safer, and more abundant nuclear fuel. The reactor is expected to be safer and more efficient than water-cooled plants. The project has been given support from the French government as part of its France 2030 innovation program and was selected as a key project by the European Commission in the EU's SMR industrial alliance framework.

Intro: RedStar Energime Green Group Corp. (Redstar) is tech company and International Nuclear and Engineering Developer Consortium. “Red Sun Mobile” is proprietary thermal storage power retrofit system 0.6 MW to 40 MW @360 MWh mobile truck, ship or train starting at only 0.6 tonnes to 29 tons respectively. With 25 x's less volume per MWh- which makes Red Sun the best for high power wireless propulsion for heavy trucks, ships, trains and planes. At 1000 Wh/kg to 1500 Wh/kg Red Sun is analog next generation, plus reliable with 50-year life

Redstar Syngas Catalyst for Algae-Biomass with Gasification:
Hyacinth Catalytic Pyrolysis:
250 kt x 17.9 MJ/kg x 0.278 kWh/MJ = 1244050 kWh = 1244 MWh- 5 mo.
1244 MWh x $120/ MWh = $1.495 M
Coconut shells: catalytic pyrolysis
500 kt x 34 MJ/ kg x 0.278 KWh/MJ
= $2.28 M over 6 mo.

REDSTAŔS'S BIOH2 CATALYST:

Designed bioengineered proprietary trade - secret cerium oxide metal complex with patentable calcine process, Redstar’s trade- secret recycled catalyst gives 0.87 L *Biohydrogen* (STP) per one gram dried lake or sea algae and cyanobacteria (and Sargassum). Two multi-million dollar awarded and pending contracts with Laguna Lake Development Authority and Dept of Ecology & Natural Resources (DENR) start Jan 18th 2025. Plus 50 MW PPA with Dept of Energy on 20 yr electricity service contract at 12c/kWh. Redstar and clients will lease the AHR with Redstar 150 MW service contract.



Above - Oakridge National Labs successfully demonstrated the feasibility of homogeneous reactor design and went critical in 1952 and successfully ran till 1957: (study) https://www.osti.gov/biblio/4353671

Redstar Patents: Catalyst & WTE Background: Am 241 & Po 209, 210

According to *Sec'y of Transportation Jamie Bautista*:"..*Red Sun saves Philippines National Railroad 40%* on *building tracks and operating trains and stations wirelessly without building catenary wire systems*!" Headed by *Nuclear Advisor to the president and DOE - Jay Dubinsky, Bioengineer,* who has developed breakthrough catalyst that transforms biomass at 0.87 liters bio-H2 per gram of dried algae and/or biomass like coconut shells (39 billion coconut shells fall per year in Philippines) this

cerium oxide metal group catalyst is processed from smelting/refining waste through trade-secret process to transform seaweed, hyacinth and coconut shell at 17.8 MJ/kg to 38 MJ/kg for clean coal replacement through super-efficient catalyst 7 times more productive than platinum- ruthenium costing $12,500 per oz.!
https://cleantechnica.com/2025/01/17/1-66-billion-turbo-boost-for-us-green-hydrogen-industry/ Green H2 $5/kg

Redstar has bioengineered an exclusive calcine process to transform refinery waste metals to high power catalysts. With extensive 3 decade career developing algae to energy tech- including ultrasound, and; featuring to biotech utilising *Quantum Fractionation in 1999;* and; 24 years developing hydrogen energy engines (*Mazda RX 8* in 1999 - 2007 with US Engineers *Jim Murray* & *Nick Eckelberry*) plus pyrolysis catalyzed systems, waste to energy, composites and algae oil systems

Top Redstar Patents:
♤ *Red Sun Thermal Battery +*
♤ *NON- COMBUSTION BRAYTON CYCLE*
♤ *Aqueous Homogeneous Reactor - AHR*
♤ *Redstar Crystal Fluoride Reactor Core & Neutron*
https://patents.google.com/patent/US20130247585A1/en blanket- non- corrosive neutron and acid - proof & explosion-proof crystal

Redstar has exclusive rights for the transformative mobile *Red Sun thermal phase change molten metal battery* called *Powersource/Red Sun* 100 kW to 40 MW; and, second patent running fuelless *Non- Combustion Brayton Cycle* pure heat by Red Sun thermal battery 1000 to-1500 Wh/kg weighs 4x's less than Li-ion per kWh.

Retrofits Diesels and

Aqueous homogeneous reactors (AHR) is a two (2) chamber reactor consisting of an interior reactor chamber and an outside cooling and moderating jacket chamber. They are a type of nuclear reactor in which soluble nuclear salts (usually uranium sulfate or uranium nitrate) are dissolved in water. The fuel is mixed with heavy or light water which partially moderates and cools the reactor. The outside layer of the reactor has more water which also partially cools and acts as a moderator. The water can be either heavy water or ordinary (light) water, which slows neutrons and helps facilitate a stable reaction, both of which need to be very pure.

Aqueous homogeneous reactor at Oak Ridge National Laboratory

Their self-controlling features and ability to handle very large increases in reactivity make them unique among reactors, and possibly safest. At Santa Susana, California, Atomics International performed a series of tests titled The Kinetic Energy Experiments. In the late 1940s, control rods were loaded on springs and then flung out of the reactor in milliseconds. Reactor power shot up from ~100 watts to over ~1,000,000 watts with no problems observed.

Aqueous homogeneous reactors were sometimes called "water boilers" (not to be confused with boiling water reactors), as the water inside appears to boil, though the bubbling is actually due to the production of hydrogen and oxygen as radiation and fission particles dissociate the water into its constituent gases, a process called radiolysis. AHRs were widely used as research reactors as they are self-controlling, have very high neutron fluxes, and were easy to manage. As of April 2006, only five AHRs were operating according to the Research Reactor database.[1]

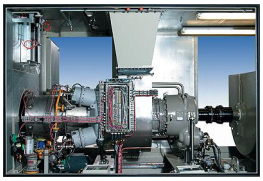
https://www.energy-reporters.com/news/nasa-unveils-nuclear-fuel-stronger-than-plutonium-and-scientists-say-were-entering-a-new-age-of-space-dominance/

Corrosion problems associated with sulfate base solutions limited their application as breeders of uranium-233 fuels from thorium. However, Redstar has solved this problem by making basalt reactors, which are corrosion- proof, with a hardness of 7 on MOH scale. Current designs use nitric acid base solutions (e.g. uranyl nitrate) eliminating most of these problems in stainless steels.

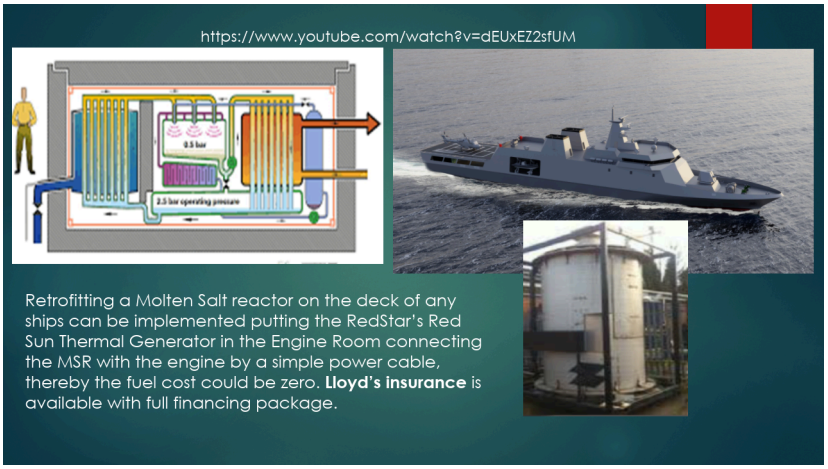
Featuring second exclusive patented *Non- Combustion Brayton Cycle:*
The second exclusive patent is Non- Combustion Brayton Cycle operating all engines and turbines on pure heat using heat exchangers in the fuel combustion chamber of *Brayton jet turbines* and injecting cryo nitrogen into rail systems of diesels. This brings power prices back 100 years with nuclear at $40/MWh. For ships, the 5.55 MW Power Block is major transportation paradigm shift with a 12 m3 total footprint; the *Red Sun Power Block* retrofits small engine rooms, maintenance closets and transformer buildings, or bus & train station closets; plus 7 x's lighter than Li-ion.

Thermodynamically, economically and logistically the *16.65 MW tri-* Red *Sun Power Block* runs destroyer- class 300 m frigates to retrofit and run for less than one-eleventh diesel costs and zero emissions with $1.5 M carbon credits per year. Plus 360 MWh Red Sun charges in 4 hours for $14.4k to sell at $28k at a rate of $120/MWh.

Red Sun 40 MW gives 360 MWh per charge and retrofits all ships and runs 13,500 HP ships and freight with 700 km range. Whereas battery electric fails in all ship and train applications for range (and GE Battery Electric costs $48 M) only gives 110 mile range for battery electric ferries and trains. Hydrogen, at only 2.22 kWh/L for cryo H2, fails for range here also with 1/5th the energy density of diesel at 9.7 kWh/L vs. Red Sun cryo nitrogen at 20 kWh/L - an order of magnitude better performance and range per volume over cryo hydrogen. Moreover; 98% of hydrogen is grey. Whereas Red Sun is master of green zero-carbon propulsion! Thus, recharging 360 MWh for $14,400 USD is one-eleventh (1/11) cost of diesel at LCOE of $430/MWh. Diesel cost=$155k on same 360 MWh!

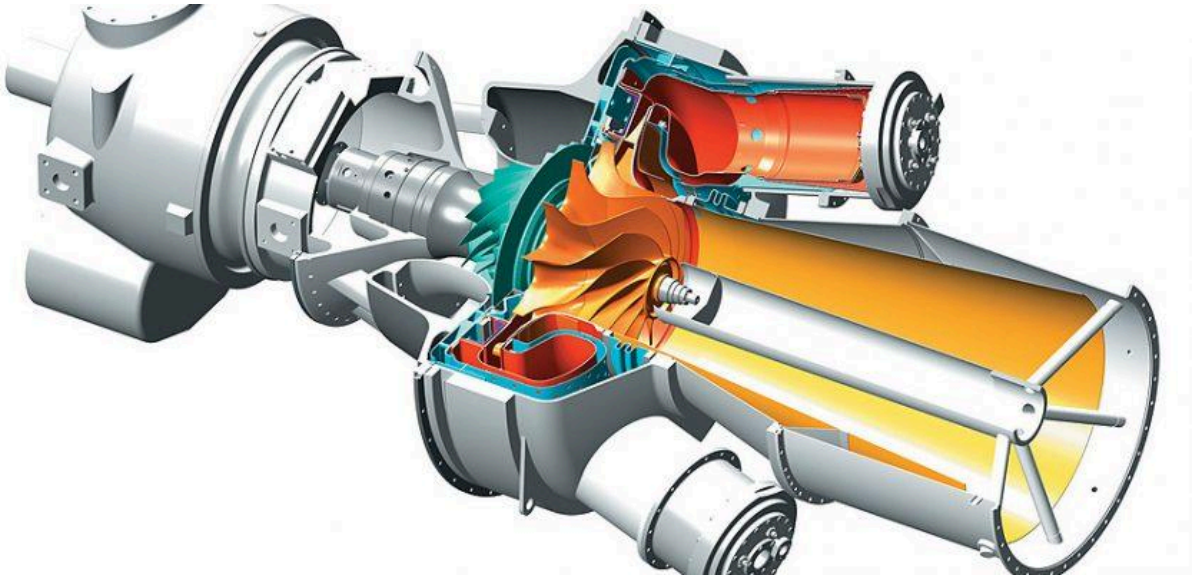

OPRA Op 16

Satellite and Cell 24/7 Tracking:
The battery is tracked by state of the art communications company *Max- Tech*: www.max-mesh.com -can track on Google maps to within 2 meters by cell, satellite or internet for metering.



Red Sun with Molten Salt Reactors and AHR will be the first mover in Nuclear ship propulsion with Maersk

Transportation, industry, rail, bus and ships need to decarbonize, and more importantly- greatly lower costs to be economically viable (all the hydrogen bus and rail companies are collapsin, or have collapsed, including French 70 yo co Safra) and continue to play a key role in our way of life. Going wireless on the trains saves 40% on building without catenary wires saving $1 bn USD on 1600 km *Laguna to Bicol Freight Expressway*, according to Transportation minister *Mr Bautista,* who is ready to jv with Redstar on 1600 km *Bicol Express Freight Line* under feasibility study now paid by $3.5M *ADB* loan to *DoTr.*



Opra Op 16 hydrogen turbine 1.85 MW x 3 = 5.55 MW
Mariner Series -150 m Sailboat/ Yacht to Large Frigates ☆ 16.65 MW
https://energy-xprt.com/products/opra-model-op16-3a-gas-turbine-generator-306868

RED SUN line Of Ship Retrofits

Hercules: 6000 KW Thermal Battery (120000 kWh/chg) + 440 kW AHR 88L/min Recharging + Hybrid Electric Diesel + Azipods – ABB Bus- running cost -$60/ MWh

20 hour operation – 800 km – 900 km Range – 30 knots - 40 knots

2 x 450 kW Tesla Turbine Gensets running on AHR 88L/min/ 44 -88 kW Genset 4hr charge with *AHR 5.5MW*

+ Induction 98% Charging 728 kW Total Wt4800 kg – Recharge while running Safe with AHR+ MazdaRx-8

Atlantis Apollo Series: 33tons 300+ Sailboat, Cargo, Cruise Ships, large Retrofit Ferries Navy Vessel+€1.8 to €4.8 m with Double AHR 5.5 MW

RED SUN 32,000 KW (300 MWh) 4x AHRs + Thermal Battery + 480 kW AHR 88L/min H2 Recharging + Hybrid Electric Diesel + Azipods – ABB Bus+2Azi Pods+2 Opra turbine

48 hour operation – 2100 km Range – 25 kn 8 hr Recharging with *H2/AHR* 88L/min H2

2 x 250 kW Tesla Turbine Gensets running on 4x 500kW AHR 88L/min Charging *POWERSOURCE* while Running+ 3 Opra turbines 5.55 MW

RED SUN AERONAUTICS – Hydrogen Planes + AHR with 7250 kWh Battery+3 Opra Turbines Op 16

POWERSOURCE 1300 kW with RX-8 Genset can give 2500 km range by charging hydrogen into thermal *batteries. ZeroAvia* plane can fly 500 miles, powered entirely by hydrogen technology.

ZeroAvia, the startup that designed the hydrogen-fueled electric powertrain inside the plane, has been testing the technology over the past year and it plans to begin supplying the powertrain for use in planes with as many as 20 seats, on flights up to 500 miles long.

Several other startups are also working on technology designed to cut emissions from air travel, an industry responsible for nearly 900 million metric tons of CO2 emissions a year at a time when emissions need to begin to shrink to zero. But most other companies rely on batteries to store electric power. (*Ampaire*, a startup that recently took its first public flight, retrofits existing planes with hybrid-electric systems; Eviation, another startup, is designing 100% battery-electric planes.) ZeroAvia saw advantages in using hydrogen. “For the foreseeable future, actually getting a sizable aircraft in the air for a reasonable amount of time will be quite difficult with batteries”. A system based on hydrogen fuel cells is around four times as energy dense as the best batteries currently available, he says.

For airlines, switching to hydrogen- fueled airplanes for short flights would save money. *ZeroAvia* estimates that the total cost of operation will be around half that of flying conventional planes because of savings on fuel costs, more efficiency, But using liquid hydrogen would require more work and 10 years in safety testing and certification; for now, the company is using compressed hydrogen stored in carbon fiber cylinders, similar to cars that are already on the road like the Toyota Mirai. The cylinders make the planes 10 to 14 x's heavier, meaning they can’t travel as far. And; cryo nitrogen makes more sense/cents and saves 95% of the cost at 2c/kWh running in inexpensive available stainless steel tanks and can't explode or cause metal embrittlement and corrosion. Thus, the *Red Sun Non-combustion Brayton cycle* jet turbine propulsion or cryo nitrogen is only practical way forward at 14x's more energy dense than compressed hydrogen. Plus, 300°C hotter and 25% more efficient for jets and airplanes, plus range extended 7 to 40 x’s because of energy density and by 700% has smallest footprint/ volume of any megawatt system (AHR as big as dishwasher) and weight(hydrogen carbon fiber tanks 14 x's heavier for equivalent diesel tank and fuel! GREEN HYDROGEN WILL REMAIN STUBBORNLY HIGH FOR decades:https://m.economictimes.com/small-biz/sustainability/green-hydrogen-prices-will-remain-stubbornly-high-for-decades/articleshow/116617497.cms

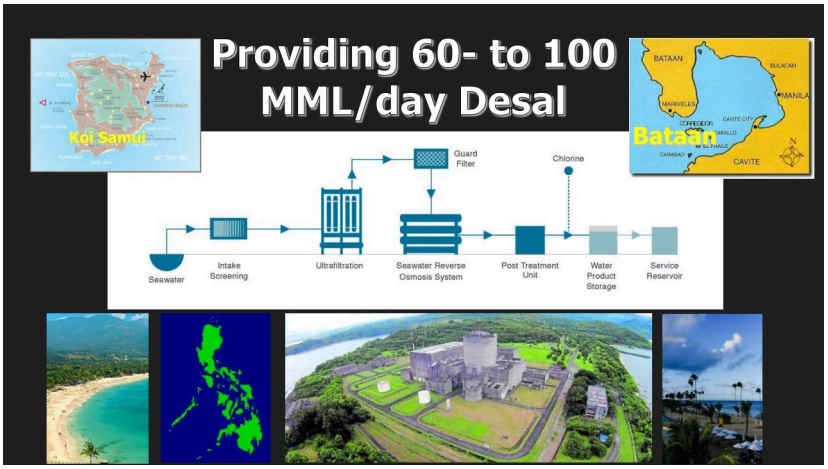
Fresh Air

To clean up the aviation industry, NASA-funded scientists are working to develop an all-electric aircraft powered by cryogenically-liquified hydrogen.

But current hydrogen cells lacked the energy density necessary to power a jet without also weighing it down too much. Cryogenically cooling the hydrogen could give rise to fuel cells dense and compact enough to do the trick, but the technology to power a plane with them doesn't exist yet —

"Advances in recent years on non-cryogenic machines and drives have brought electric propulsion of commercial regional jets closer to reality, but practical cryogenic systems remain the 'holy grail' for large aircraft because of their unmatched power density.

Petroleum-derived liquid fuels currently provide around 95% of transport energy, and roughly 60% of crude oil produced is used to make transport fuels. The demand for transport fuels across the world is very large, at around 4.9 billion liters each of gasoline and diesel and 1.3 billion liters of jet fuel *each day*, with an expected yearly growth of around 1%. Changes in the transport sector are occurring because of increasing demand driven by increasing population and prosperity.



ABOVE - AHR *low band energy* 120°C heat to 320°C from the *AHR* reactors can run primary 2 MW steam turbines and use waste heat from turbines or biomass pyrolyser for desalination and kiln drying biomass. This gets your energy efficiency up to 75%. And utilizing heat to 120°C down to 60°C can be used to heat adjacent tilapia ponds (Redstar is doing research and fish farm hatcheries grow tiger shrimp with *Mindanao State University -MSU* growing fish and tiger shrimp energetically charging water for stronger growth and oxygenation for plant/fish and cleans environment www.theimploder.com. as oxygenation sterilizes water and fish).

"In hydrogen aviation so far, hydrogen chemical energy is converted to electrical energy through a series of fuel cells, which drive the ultra-efficient electric propulsion system, but lose 40- 50% in fuel cell to convert H2 to DC current. The low temperature requirements of the hydrogen system also provide opportunities to use superconducting, or lossless,energy transmission and high-power motor systems. However, hydrogen has an achilles heel that is unsurmountable in that it has a very low volumetric energy density of 8 MJ/kg for cryo hydrogen at -253°C, which is only 2.22 kWh/L, while diesel is 9.7 kWh/L at 650°C! Doubling that, Red Sun cryo N2 for diesel retrofits is orders of magnitude higher than H2 at 20 kWh/L heated to 200°C vs 0.5 kWh/L for compressed H2 at 195 bar. Plus nitrogen costs 2c/L and is made from the air vs. German hydrogen at €11/kg to $6/kg in the US - 300 x's more in EU to 20 x's in US!

Advances in recent years on non-cryogenic machines and drives have brought electric propulsion of commercial regional jets closer to reality, but practical cryogenic systems remain the 'holy grail' for large aircraft because of their unmatched power density and efficiency," Haran said. "The partnerships that have been established for this project position us well to address the significant technical hurdles that exist along this path." However they cant change the low energy density and absolute zero freezing temp necessary to store H2; so hydrogen is over before it can begin

The Barrier: Cryogenic H2 at 2.2 kWh/L gives 30% more range as 700 bar H2. Yet, only 195 bar is allowed for all marine applications under IMO regulations, giving 1/5th cryo H2 at 0.5 kWh/L and 1/40th Red Sun cryo nitrogen at 20kWh/L. Red Sun Power Pack converts and multiplies usable power of hydrogen through turbine genset to store hydrogen electricity as heat at 98.6% efficiency through induction, and amplifying with cryo nitrogen is 65% energy efficient and triples torque on return cycle through nitrogen's 1500 x's expansion (vs only 432 x's for gasoline). And; *5.55 Red Sun.Power Block* is especially good where heavy high torque loads of sea cargo and fast ships and freight trains in hilly areas like the Philippines require it; or high heat industries of mining and smelters giving direct ladle

heat of 1850°C in refineries & factories

Summary Conclusions- RED SUN Transition to Clean Energy:

Nitrogen is 700 x's better than H2 for power and running piston engines and will take over, as heated cryo nitrogen gives 40 x's energy density of compressed H2 for marine use at 195 bar. And: cryo nitrogen gives 10 x's energy of cryo hydrogen at -253°C. The difference is, Red Sun patented *Non Combustion Brayton Cycle* and cryo nitrogen with energy density 10 x's cryo hydrogen to run heavy ships 700 km with 32 MW. This is forever out of reach for H2 cryo hydrogen at only 2.2 kWh/L unless tanks cover the entire ship. Plus at one- 39th the cost of cryo hydrogen, cost per liter of liquid nitrogen is only 2 US cents/L; and; cost for AHR hydrogen is only 28 cents US/kg vs German hydrogen 1100 cents Eur/kg (1100/28 = 39.2 x's more for H2 vs Red Sun cryo nitrogen)!

Plus, at this time, when carbon taxes are set to go to $150/tCO2 (see article below), ships, trains and trucks need clean working affordable solutions that enable retrofitting current fleets of diesel engines, without spending millions of dollars, and ICE's that are using petroleum-based fuels for decades. With crude oil at $72 USD/BBL today (Feb 10th, 2025), the shipping industry in particular is at a critical crossroad. Trains, ships and planes need Red Sun cryogenic N2, plus pure heat of *RED SUN MOBILE and smaller PowerSource* thermal batteries at 1850ºC, tested and certified by *GE Marine*, *Siemens Marine*, *Rolls Royce*, *Pratt and Whitney* to *Cummins*, *Man, VW, Porsche, Kawasaki, Isuzu* and *Wartsila* - to run all jet engines, diesels and trains. For example, with a five-year old *GE Diesel Electric* purchase and retrofit costing $4.9 m including a battery car consisting of 32 MW or 65 MW Red Sun on a budd car. This retrofit pays for itself in 196 days- including the locomotive! Plus; as part of the transition, Redstar has two proprietary hydrogen systems with the AHR; and; featuring the brand new *Redstar Algae to H2* system for gasifiers makes 18 tons biohydrogen per day to run large gensets with high temp. catalytic pyrolysis syngas and hydrogen systems in 150 m2 footprint. Thus, RED SUN thermal battery AHR- Cryo N2 *Red Sun Power Block* is amplifier by converting to heat and to cryo nitrogen multiplies torque three times, while adapting and transforming wind and solar into baseload power as transformer for intermittent renewables creating *Energy Arbitrage* charging mobile Red Sun at geothermal, hydroelectric and wind at night at 3c/kWh and selling at peak hours. Key to sustainability and affordability is efficiency in energy transformation is key, thus by induction charging the thermal batteries at 98.6% and discharging at 65%, only 35% is lost, vs 75% for fuel cells and other competing energy systems that lose as much as 88% of the energy.

Thus, RED SUN Battery transformer runs all types of industry, refineries, and manufacturing - charging by 8 methods- at high heat above 1000°C, which Red Sun 1850°C enables. Plus, AC and large refrigeration systems for malls, train stations and airports require huge amounts of heat which Red Sun easily supplies at half the retail cost at 12 c US/kWh. Plus, light enough to go on most roofs or ships.

Also, by allowing the collection of inexpensive night energy to sell in day, *RED SUN Arbitrage* carves a new energy niche, creating large financial gain by buying renewable energy at night placing its mobile 4 MW to 32 MW RED SUN battery (29 tons) at renewable sites from 10 PM to 8 AM and buying for 3c/ kWh, to deliver in day to distributed power plants to sell at peak rates when demand highest.

Hydrogen is expected to be a 211 billion industry by 2020, mostly derived from fossil fuels (much to the delight of the oil comppanies), as hydrogen planes and hydrogen cars and trucks are already out now with Honda, Toyota and Nikola Trucks and now Zero Avia.. Furthermore, over the next 20 year

generational scale, the shortage of oil will not constrain growth in transport; known reserves of oil have been increasing faster than consumption over the last several decades, and the current reserves should last for at least the next 50 years at current consumption rates. Therefore, it's imperative to improve efficiency, environmental impact, and affordability of ICEs, which will mostly continue to power transport in the foreseeable future. The oil companies want to cause a transition to hybrid ICE cars with electric power trains that have the ability to use (chemically derived) hydrogen also and power generators onboard, with the ability to scale up to large planes, trains, and trucks. Red Sun will use clean radiolytic hydrogen from the AHR, or made by pyrolysis of biomass; charging RED SUN thermal batteries with hydrogen running small hydrogen 250 kW to 350 kW gensets or JCB RX-8 rotary hydrogen engine to run EMF crucible *Inductotherm charger for Red Sun thermal batteries.*

RETROFITTING DIESEL TRAINS & SHIPS *TO* RUN AT 20 CENTS ON $!
Below-schematic-tertiaryTesla Turbine

With *biohydrogen* from the *AHR* at 28c/kg or 4 c/kWh, and can run *Mazda*, *Ge*, *JBC* or *Tesla Turbines* as primary generators. The heat from AHR operate off the shelf steam turbines or Ammonia Kalina cycle and; is small and light enough to run onboard to monopolise ship and train propulsion! Plus, RED SUN gives highest energy density, critical for transportation and airplanes, tripling range and 32 MW gives 360 MWh to run *GE Diesel Electric train* 700 km with 64 MW batteries giving 1400 km (and is self-charging while running) utilizing the Red Sun thermal batteries onboard. Plus Red Sun gives a safe redundant back-up system that can store energy for months, plus have the best energy per weight ratio of any battery, at 32 MW/29 tons = 1.1 kWh/kg; with amazing 120 MWh in 6 MW (5.5 tonnes) vs *Tesla Model S* at 85 kWh/540 kg, which is only 0.16 kWh/kg. Thus, RED SUN has seven times the energy per kg as a *Model S*, and 32 MW Red Sun battery contains the equivalent of over *4000 TESLA MODEL S* batteries! Cryo nitrogen at 20 kWh/L is 40 x's more energy dense than 0.5 kWh/L compressed hydrogen at 200 bars and 14 x's more energy dense than 700 bar hydrogen. And; stainless steel N2 tanks are eight times less expensive than cryo hydrogen carbon fiber tanks and order of magnitude lighter! Now,
Longhaul Range of 1400 km is possible with two *32 MW Red Sun* batteries on bud car with a locomotive.

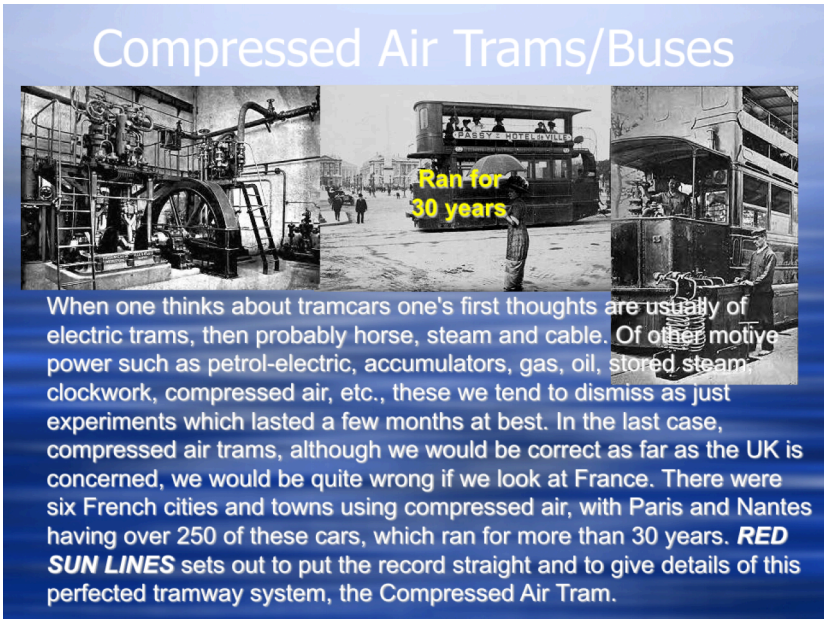
Thus, lithium battery can't compete in weight and size-sensitive transport and neither can hydrogen for shipping, and are being left behind in favor of biofuels or green methanol. Red Sun energy density and cost saving can save the shipping industry for cost and logistics and soon to be crushing carbon taxes, while giving one million long-lasting cycles! Red Sun lasts 50 years vs. 6,000 cycles (6 to 8 years) for *Tesla Model S*. And; introducing Redstar's *AHR* 88L/min to 500 L/min, releasing hydrogen

on demand at 28c/ kg vs USA averaged $4 - $ 6 USD per kg (200 times more) and €11/kg in Germany- giving 1800 USD/ MWh vs *Red Sun Power Block* at $40/MWh running nuclear AHR charging- thus giving better than 90% savings, or an order of magnitude cost per mile saving over traditional hydrogen. Which on the *Nikola Hydrogen Truck* is expected to be 90 cents per mile https://nikolamotor.com/motor. Thus, with AHR 88L/min would drop running costs to 3c/ kWh or 3.1 cents per mile! Thus, the Red Sun power Block plus *AHR* 88L/min integrated thermal electric platform is the definition of the *HYDROGEN ECONOMY* at work now
https://newsroom.mazda.com/en/publicity/release/2010/201005/100519a.html

Above - Redstar's CEO- Jay Dubinsky- helped develop the Rx - 8 Mazda ceramic hydrogen engine from 1998 to 2010, with duel ports and 2/3rds longer burn time compared to IC engines. And; gives higher performance per weight than IC engine; and triple rotor 787 Mazda won Le Mans in 1991! Single Mazda Rx 7 or Rx 8 rotors support 2 pancake axial generators running 100% hydrogen for 350 kW for 1.4 MW for 4, and 2.8 MW for 8 at Cost $325k for 350 MW.

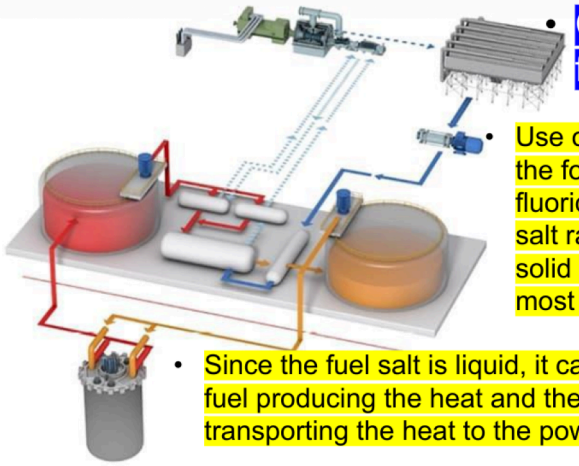
♤ The magic of *Red Sun Thermal Batteries* is heated compressed air gives twice the energy of gasoline 20 kWh/L vs 11 kWh/L for gasoline, and N2 gives1500 x's expansion which is 3.5 times more power and torque over gasoline (gasoline is 432 x's expansion at 550°C) - meaning Red Sun is power transformer that triples horsepower and carries 10 x's heavier loads for ship, train, and truck with more than double round trip green energy efficiency at 65% vs 25% Fuel cell round trip green energy efficiency.
♤ *RED SUN/PowerSource* outer containment designed & guaranteed 10 yr by *Thyssenkrupp!* Triple charging with 6 MW recharge is 2 hrs, which hyper-extends range 3 x's to 7 x's with onboard thermal battery-turbine charging, while *AHR 88L/min.* is running *Mazda Rx- 8* at 350 kW or newer small 112 kW *Rx - 30* onboard running induction 250 kW chargers, and regenerative braking charges thermal or electric chemical battery, or both- allowing retrofitting all vehicles
and trains giving much higher torque.
♤ Featuring *5.55 MW Red Sun Power Block* onboard thermal battery-turbine nuclear hydrogen / steam charging, while AHR 88L/min biohydrogen is generated onboard to recharge, & regenerative braking charges Red Sun battery also.
♤ This is the thermoelectric platform mimicking the Earth and Sun- Thermoelectric system of heating with DC lightning and nuclear Uranium and thorium under heat, pressure and voltage differential. Thus, Red Sun, charged by Nuclear electricity runs EMF crucible (www.inductotherm.com) to heat molten Ni Fe alloy, while transforming electricity to core heat in metal battery with 98% efficiency and incredible energy density-a battery as big as suitcase powers turboprop 8 hours full power (180kW).

♤ Cryo nitrogen added to all diesel rails give *3.5 x's torque and 20 kWh/ L vs Diesel at 9.7 kWh/ L and 700 bar hydrogen at 1.6 kWh/ L. Thus,* heating N2 to 200°C gives 1500x's gas expansion triple gasoline at 1/3rd temperature! Plus, 300 x's less per L!



Above- Nitrogen trains running 1842 to 1930s throughout Europe and parts of Americas, Africa and Switzerland ran coal N2 boiler. 150 years later coal boillette replaced by clean Red Sun Why Nitrogen
♤ All engines designed to use pure heat- Red Sun gives 1450°C pure heat non- intermittently and enables 50% longer life and half the maintenance + 25 db less noise!
♤ Thermal Nickel batteries are scalable at $*20 USD per* 1 *kWh* capacity *vs Tesla Panasonic* at $111 USD /1kWh capacity- while lithium battery 25 x's bigger vol vs Red Sun
♤ The Tesla battery is Li-ion that typically lasts 6 -8 years- vs our 50 yrs
♤ After the piston compresses the fuel-air mixture, the spark ignites it, causing combustion. The expansion of the combustion gases pushes the piston during the power stroke, which can be done with 3.5 x's more force or torque using cryo nitrogen at 1/11th $$

MSR = Radioactive waste removal + non-proliferation + safety



- Controlled fission
- Use of fluid fuel in the form of very hot fluoride or chloride salt rather than the solid fuel used in most reactors.
- Since the fuel salt is liquid, it can be both the fuel producing the heat and the coolant transporting the heat to the power plant.
- Since the MSR operates at atm. pressure it can't explode!

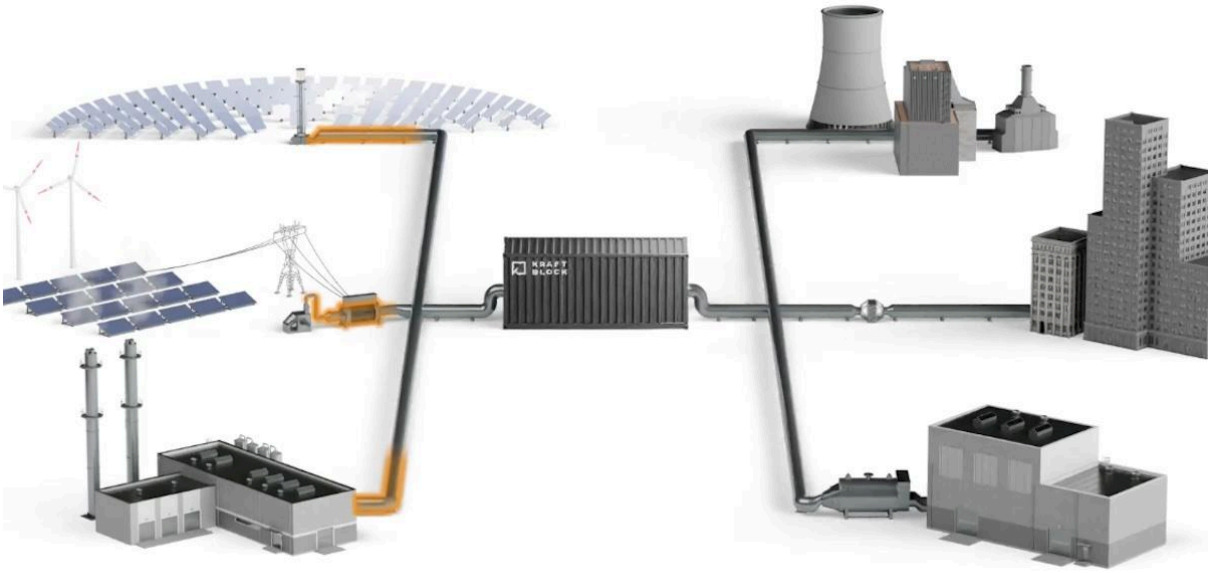
Propulsion:

The future of shipping is placing *Molten Salt Reactors* and *AHRs* on ships for propulsion and energy. The alternatives of hydrogen and ethanol look silly and vastly more expensive in comparison:

Current hydrogen regimes include costly fuel cells at $60k, with only 25% full cycle efficiency when making green hydrogen vs Red Sun's 65% efficiency!
♤ Carbon fiber tanks are ten times more expensive than stainless steel cryo nitrogen tanks and bulky - 14 x's bigger than diesel tanks. On ships, compressed hydrogen is only allowed at 195 bar under *IMO* regulations, giving only 1/40th the energy density of heated cryo nitrogen (20 kWh/L), so tanks weigh 14 x's the weight of normal diesel ones containing equivalent energy. Plus, insurance becomes difficult and more expensive.
♤ Hydrogen H2 Mobility refueling station costs €1.9 M. Beijing has only 7
♤ Here is the future of shipping:
https://interestingengineering.com/transportation/russia-nuclear-powered-icebreaker-yakutia
The future has to include the 18 trillion dollar transportation base and industrial engines, turbines and diesels to transition to 100% carbon free energy over the next Century.

Only Red Sun offers this analog retrofit high heat battery that takes over the job and 90% of the expense of fuel while giving service to Ships, Trains and transportation with patented Non-Combustion Brayton Cycle retrofits.

Retrofitting *GE Diesel Electric* locomotives and ship engine rooms, at only 18 m3, Red Sun mobile 32 MW combines existing engines with 1st mobile solid state high heat battery that is 25 x's smaller and 10 times lighter and 5.5 x's less expensive at $20/kWh vs. $111/kWh for Li- ion. Only low-cost nuclear can make the *Hydrogen Economy* bloom through Red Sun Transformer!!



Thermal storage beats hydrogen, electrification on industrial costs
https://www.pv-magazine.com/2025/01/29/thermal-storage-beats-hydrogen-electrification-on-industrial-costs/

Nitrogen Replaces Hydrogen for Directly Running Piston Engines with 700 x's more Power:

The element nitrogen shows extraordinary potential to transform multiple applications because it displays significant energy compared to hydrogen by 700 times, the nitrogen engine is the future. The search for renewable vehicle fuels revealed two major breakthroughs where nitrogen has proven a much more exciting option. The exceptionally potent option is 700 times stronger than hydrogen, so it can introduce a transformation to power plants and automotive manufacturing. Scientific researchers and private companies are investigating nitrogen energy technology since this old (they think its old) promises more efficient and cleaner power than standard fuels.

The renewable fuel sector has identified the abundant atmospheric element nitrogen as its new abundant power source. The production and storage of nitrogen prove easier than hydrogen because its needs neither complex nor expensive processes. The transformation of nitrogen from liquid to gas phase enables enormous expansion in engines that drive piston motion for power generation.

Using tiny amounts of heat, Red Sun thermal batteries with cryo nitrogen retrofit all diesel rail system in new format to drive diesels with expanding heated gas (1500 x's at 200°C vs gasoline at 432 x's at 600°C) as they were first originally designed to do- cleaner,, and with 3.5 x's more torque and power. The end products of nitrogen combustion mainly consist of nitrogen, making nitrogen a carbon-neutral option against fossil fuels.

The potential elimination of hydrogen fuel exists because of nitrogen technology. Hydrogen is a future fuel option, despite facing various problems with its use. The current production process for green hydrogen requires expensive energy and involves methods like water molecule splitting and hydrogen supercooling for liquid storage maintenance. Current hydrogen refuelling infrastructure remains poorly developed with only seven Beijing stations, resulting in lower convenience for broad market applications and use.

Storage and handling of nitrogen prove simpler than nitrogen execution. People can keep nitrogen in special tanks under low temperature without using 40% of the energy as required for hydrogen, thus proving better practicality and cost efficiency.

Nitrogen Powered Engines: The Actual Impact on the Environment.

The major advantage of nitrogen as a fuel stems from its negligible environmental consequences. Nitrogen based engine applications result in products based solely on oxygen and nitrogen gas emissions. The transport sector find nitrogens highly appealing (trains of 1940's to 1930's) because they help decrease carbon emissions.

Intense nitrogen emissions do cause environmental disturbance. And; scientists tackle nitrogen environmental impact issues by developing technologies that transform exhausted nitrogen emissions into safe components. Despite these challenges, the overall environmental benefits of nitrogen far outweigh its potential drawbacks.

The technological potential of nitrogen appears vast. Further advancement of nitrogen engine technology requires major investment to develop technology on a mass production scale. The widespread use of nitrogen vehicles requires developing an entire system to support their fuelling needs. Yet, the application of nitrogen technology has established itself as one of the best alternative fuel systems for the current era. The proven 80+ year track record running N2 trains becomes stronger thanks to high energy and torque capabilities and environmentally friendly properties. Plus, with Red Sun, nitrogen applications will extend to industrial and manufacturing applications, where it goes hand in glove with power applications.

Research indicates that nitrogen will gain industrial applications extending past transportation. Researchers investigate nitrogen-based applications extending into power generation systems, industrial machinery, and aerospace equipment. The constant advancement will transform nitrogen-based systems into industry-redefining entities that minimize our reliance on fossil fuels. Companies' advancement of this technology will substantially boost their ability to create a sustainable future. ***Nickel & Copper Flash Smelting Run by AHR****:*
With the focus on manufacturing thermal batteries and reactors while using AHRs low energy costs and high power to greatly lower the cost of green metals the highest and best use of both AHR and Red Sun *is running Ni and Cu Flash smelters by AHRs radiolytic 2.8c/ kg hydrogen (turned into hydrogen plasma), a process that take the heat from oxidation of sulfides that turn sulfides releasing the metals into nickel matte; and; slag, directly reducing and melting it and separating slag while blowing commercial oxygen onto heated sulfides at 650°C to produce 1400°C smelting heat. Thus, 3/4ths of the smelting heat comes from the oxidation of sulfides.* Ni flash smelting is a high productivity smelting process which efficiently uses heat from the sulfide mineral oxidation to heat and melt the furnace products and efficiently captures its by products SO2. However, it is an oxidizing process and loses significant amounts of nickel to slag. However, it is an oxidizing process and loses significant amounts of nickel to slag. The reactions in flash smelting furnaces produce Copper matte, iron oxides, and sulfur dioxide. The reacted products fall in a bath at the bottom of the furnace, where iron oxides react with fluxes, such as silica and limestone to form slag. Either hot calcine from the roaster or raw unroasted concentrate is melted with siliceous flux in a smelting furnace to create copper matte. Metso Flash Smelting Process: https://youtu.be/hLEldWy3KeI?si=yYonr3a1Tge22GpP https://youtu.be/chuOVQziQ5c?si=LSz7WaatkUxIuspX. Flash Smelting: https://www.sciencedirect.com/topics/engineering/flash-smelting

Red Sun Power Block FINANCIAL PRO FORMA:

5.55 MW 6 MW RED SUN + 4x AHR + 3 x Opra 16 5.55 MW POWER BLOCK FOR SHIPS

Year	0	1	2	3	4	5	6	7	8
	2025	2026	2027	2028	2029	2030	2031	2032	2033
CAPITAL EXPENDITURES ($1000 USD)									
Equity Investment Capex	−6230								
REVENUES ($USD)									
MWh/yr		36600	36600	36600	36600	36600	36600	36600	36600
PPA Rate ($/kWh)		0.12	0.12	0.12	0.12	0.12	0.12	0.12l	0.12
Am241 + Po211 350d/yx8g/d=(g/yr)		2800	2800	2800	2800	2800	2800	2800	2800
Radioisotope Sales Revenue$2k/g($/yr)		5600000	5600000	5600000	5600000	5600000	5600000	5600000	5600000
Electricity Sales ($) Revenue per PPA		3772000	3772000	3772000	3672000	3672000	3672000	3672000	3672000
Green Tag Rate		0	0	0	0	0	0	0	0
Green Tag Sales Revenue		0	0	0	0	0	0	0	0
Carbon Credits (t) 0.553 tCO2/MWh		20,240	20240	20240	20240	20240	20240	20240	20240
Carbon Credits ($) $24/tCO2 Ave. 2024		485,700	485700	485700	485700	485700	485700	485700	485700
Production Incentive Payments		0	0	0	0				
TOTAL REVENUE		9858000	9858000	9858000	9858000	9858000	9858000	9858000	9858000
EXPENSES ($1000)									
Operations & Maintenance		445	446.35	447.741	449,173	450,648	452,167	453,732	455,344
Contingency Fund		25	25,5	26,01	26,53	27,061	27,602	28,154	28,717
Project Management Fee		70	71,4	72.828	74.29	75.77	77.29	78.83	80.41
Insurance		21	21.42	22	22.3	22.7	23.2	23.65	24.12

Property Tax	99	99	99	99	99	99	99	99
Leaseholder Payments 48 mo	248	248	248	248	248	248	248	248
Admin/Financial/Legal Management	5	5,1	5,202	5.31	5.41	5.55	5.63	5.74
Production Tax Expense	12.1	12.2	12.5	12.8	12.9	13.0	13.2	13.3
Warranty Expense	20	20.4	20.81	21.22	21.65	22.3	22.87	23.47
Shipping costs of radioisotopes	35	35	35	35	35	35	35	35
Personnel	320	320	320	320	320	320	320	320
purchasing night hydroelec	900	900	900	900	900	900	900	900
Annual total Opex	2204	2204	2204	2204	2204	2204	2204	2204

EBITDA & Taxable Income ($1000 USD)								
EBITDA	7654	7654	7654	7654	7654	7654	7654	7654
Depreciation	625	625	625	625	625	625	625	625
Debt Interest Payment	253	253	253	253	253	253	253	253
Total Annual Expenses	3082	3082	3082	3082	3082	3082	3082	3082
Income Accumulated	6776	13552	20328	27040	33880	40660	47432	54208
Taxable Income	6776	6776	6776	6776	6776	6776	6776	6776
Return on Investment %	108%	216%	325%	434%	542%	650%	759%	867%

TAXES

Redstar's World- Class Science & Engineering Team

Jay Dubinsky, *CEO*
Redstar Energime Green Group
www.redstarRedstar.com
+ 63 945 186 9816
Whatsapp
+ 66 618 485 949

Appendix 1.
MAERSK TURNING TO Nuclear to power cargo ships with custom $8M H2 engines

UCLEAR
TO
POWER
cargo

H2
engines

Updated: August 16, 2024

Can Nuclear Power Propel Maritime into a Zero-Emission Era? Maersk to Explore Nuclear for Ships

FacebookTwitter

Nuclear energy is emerging as a potential game-changer for the maritime shipping industry, which currently relies heavily on fossil fuels. With global shipping responsible for nearly 3% of greenhouse gas emissions, there's a pressing need to explore cleaner energy alternatives. And the integration of nuclear power into the maritime shipping industry is gaining momentum as a promising solution to achieve zero-emission shipping.

Danish shipping giant Maersk has joined forces with Lloyd's Register (LR) and UK-based Core Power to explore the potential for nuclear-powered container shipping in Europe. This collaboration represents a significant step in the maritime industry's efforts to decarbonize.

Teaming Up for Nuclear-Powered Shipping

The study will focus on the feasibility of using a fourth-generation nuclear reactor for powering container ships. Unlike traditional nuclear reactors, these small and mass-produced reactors are designed to consume less nuclear fuel while being less powerful. The partnership will evaluate the necessary regulatory frameworks and safety requirements to operate nuclear-powered vessels in European waters.

Maersk's head of fleet technology, Ole Graa Jakobsen, acknowledged the challenges associated with nuclear power while also noting that if these challenges can be overcome, nuclear power could become a viable decarbonization option for the logistics industry within the next 10 to 15 years.

Nick Brown, CEO, Lloyd's Register, remarkably highlighted the role of nuclear in the maritime industry saying that: *"A multi-fuel pathway to decarbonising the maritime industry is crucial to ensuring we as an industry meet the IMO's emission reduction targets and nuclear propulsion shows signs of playing a key role in this energy transition."*

Core Power's CEO, Mikal Bøe, echoed Brown's sentiment noting that "there's no net zero without nuclear." The maritime sector has been increasingly considering nuclear fuel as a potential solution to reduce its carbon footprint. A survey conducted by the International Chamber of Shipping in May 2022 highlighted growing interest in nuclear-powered commercial ships, with some experts predicting their viability within the next decade.

The collaboration between Maersk, LR, and *Core Power* signals a forward-looking approach to addressing the environmental impact of shipping.

Advanced Nuclear Reactors: The Next Frontier in Maritime Decarbonization:

Nuclear power has a long history of use in naval vessels since the 1950s, and its application in commercial maritime shipping is being revisited due to the urgent need for decarbonization. The U.S. is exploring the potential of marinized nuclear reactors to replace aging fleets and meet the International Maritime Organization's (IMO) target of a 50% reduction in CO2 emissions by 2050.

Among various types of nuclear energy technologies available, SMRs (small modular reactors) are particularly appealing for maritime applications due to their compact size and enhanced safety features.

- SEE MORE: Are SMRs The Future

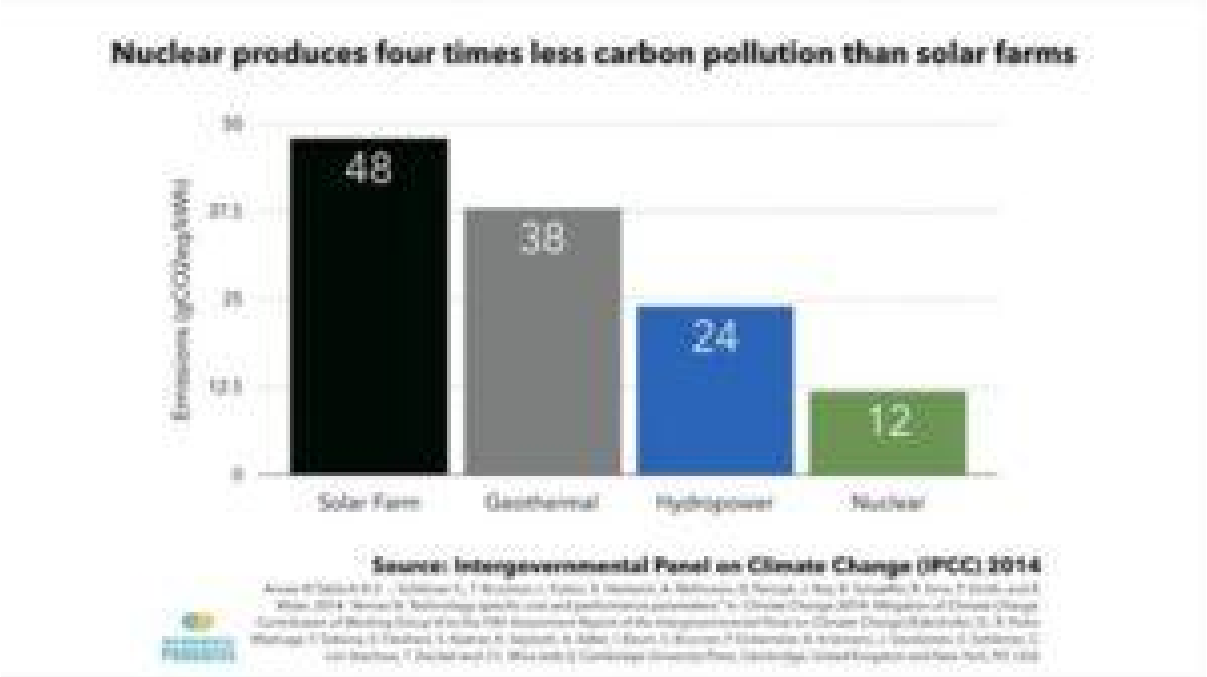
SMRs are smaller and more flexible than traditional nuclear reactors, making them suitable for installation on ships. SMRs could provide ships with a steady supply of power, enabling them to travel long distances without the need for frequent refueling stops. This could be especially beneficial for large cargo ships and icebreakers operating in remote areas.

MSRs, a type of SMR, offer even greater potential with their ability to operate on various fuel cycles, including thorium, and provide extended refueling intervals.

Countries like the U.S., South Korea, and Denmark are at the forefront of developing these reactors.

Why Nuclear Power Could be the Key:

One of the most compelling reasons to consider nuclear energy for maritime shipping is its potential to reduce GHG emissions. Nuclear-powered ships do not emit carbon dioxide during operation, unlike conventional ships that burn fossil fuels. More notably, nuclear generates 4x less carbon emission than solar farms.



Additionally, nuclear energy produces minimal waste compared to fossil fuels, and advances in waste management have made it safer and more manageable.

Moreover, nuclear energy offers a high level of energy security and independence for ships. Unlike fossil fuels, which are subject to price fluctuations and geopolitical tensions, nuclear fuel is abundant and can be sourced from multiple countries.

However, while the potential of nuclear-powered ships is significant, there are challenges related to regulatory approval, public perception, and the high initial costs of reactor development. Still, countries like Russia, China, and the U.S. are making strides in overcoming these hurdles.

Russia, for example, already operates nuclear-powered icebreakers and floating power plants, demonstrating the feasibility of nuclear technology in harsh marine environments.

In the U.S., the adoption of nuclear power in maritime shipping could revitalize the domestic fleet, particularly under the Jones Act. The regulation mandates that goods transported between U.S. ports must be carried on U.S.-built and operated ships.

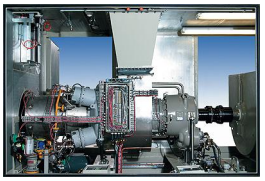
Could Nuclear Power Revolutionize Shipping?

The development of SMRs and advances in nuclear technology are making it increasingly feasible for commercial vessels to be powered by nuclear energy. However, careful consideration of safety, regulatory, and public perception issues will be crucial as the industry moves forward.

In conclusion, nuclear energy presents a promising opportunity for the maritime shipping industry to reduce its environmental impact and increase energy security. While there are still many challenges to overcome, the potential benefits make it an option worth exploring. With continued research and

development, as well as the establishment of appropriate regulatory frameworks, nuclear-powered commercial shipping could become a reality in the coming decades.

74.61	-0.07%
78.50	0.00

Global nuclear energy production is set to reach a record high in 2025, driven by increased investment and growing demand. The resurgence of nuclear power is  by factors such as the need for reliable, baseload power and the growing concerns about climate change. However, the concentration of nuclear technology supply chains in China and Russia poses risks to global energy security and could undermine Western sanctions against Russia. The world will generate more nuclear energy in 2025 than it ever has before. A brand new report from the International Energy Agency (IEA) says that “the market, technology and policy foundations are in place for a new era of growth in nuclear energy over the coming decades.” The public and private sectors alike are realigning in support of nuclear energy expansion for the first time in decades as nuclear presents an increasingly tempting solution to satisfying ever-expanding energy needs while also meeting decarbonization targets. “It’s clear today that the strong comeback for nuclear energy that the IEA predicted several years ago is well underway, with nuclear set to generate a record level of electricity in 2025,” stated IEA Executive Director Fatih Birol in relation to the publication of last week’s report. “In addition to this, more than 70 gigawatts of new nuclear capacity is under construction globally, one of the highest levels in the last 30 years, and more than 40 countries around the world have plans to expand nuclear’s role in their energy systems.”

While the drawbacks of nuclear energy are well-known and multiple – the million-year challenge of nuclear waste management, high up-front costs, and a handful of high-profile nuclear disasters – its backers argue that these downsides do not come close to eclipsing nuclear energy’s many benefits. As solving the global energy trilemma – providing, sufficient, clean, and affordable energy – becomes increasingly difficult as well as dire, nuclear energy advocates say that we can no longer afford to ignore the solutions that nuclear energy offers. Critically, nuclear fission is a proven zero-carbon technology that can produce ‘clean’ electricity around the clock and according to demand, unlike variable renewable energies such as wind and solar.

As a result, global investment in nuclear power is sharply on the rise. Annual investments in the revitalized sector are projected to reach a whopping $75 billion by 2030, and 63 reactors are currently being constructed. When they’re finished, they will bring an additional 70 gigawatts of added capacity

“That growth can partly be attributed to rising private sector interest, in particular to meet the round-the-clock energy needs of data centers,” the news outlet Semafor reported last week. Indeed, the tech sector has thrown its weight behind nuclear expansion, research, and development in a big way in recent years as Silicon Valley’s energy demands explode.

Oil Executives Fume as Trump Shakes Up Climate Rules Again Coal Continues to Dominate China's Energy Landscape

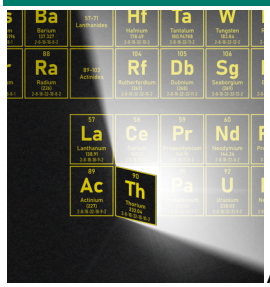
CarbonCredits.Com
Appendix II - IEEE.org

Appendix II - Why China Is Building a *Molten-Salt Reactor*. REDSTAR IS MAKING NEW neutron-proof neutron collector blankets, for Thorium and *all reactors*, out of fluorine crystal that is corrosion-proof.. This reactor and blanket is neutron, acid and heat proof up to 1800°C and last 100 years.

EnergyFeature

Why China Is Building a Thorium Molten-Salt Reactor

China’s demo reactor could breed nuclear fuel from rare earth waste



After a half-century hiatus, thorium has returned to the front lines of nuclear power research as a source of fuel. In 2025, China plans to start building a demonstration thorium-based molten-salt reactor in the Gobi Desert. The 10-megawatt reactor project, managed by the Chinese Academy of Sciences’ Shanghai Institute of Applied Physics (SINAP), is scheduled to be operational by 2030, according to an environmental-impact report released by the Academy in October. The project follows a 2-MW experimental version completed in 2021 and operated since then. China’s efforts put it at the forefront of both thorium-based fuel breeding and molten-salt reactors. Several companies elsewhere in the world are developing plans for this kind of fuel or reactor, but none has yet operated one. Prior to China’s pilot project, the last operating molten-salt reactor was Oak Ridge National Laboratory’s Molten Salt Reactor Experiment, which ran on uranium. It shut down in 1969.

Thorium-232, found in igneous rocks and heavy mineral sands, is more abundant on Earth than the commonly used isotope in nuclear fuel, uranium-235. But this weakly radioactive metal isn't directly fissile–it can't undergo fission, the splitting of atomic nuclei that produces energy. So it must first be transformed into fissile uranium-233. That's technically feasible, but whether it's economical and practical is less clear.

China's Thorium-Reactor Advances

The attraction of thorium is that it can help achieve energy self-sufficiency by reducing dependence on uranium, particularly for countries such as India with enormous thorium reserves. But China may source it in a different way: The element is a waste product of China's huge rare earth mining industry. Harnessing it would provide a practically inexhaustible supply of fuel. Already, China's Gansu province has maritime and aerospace applications in mind for this future energy supply, according to the state-run Xinhua News Agency. Scant technical details of China's reactor exist, and SINAP didn't respond to *IEEE Spectrum*'s requests for information. The Chinese Academy of Sciences' environmental-impact report states that the molten-salt reactor core will be 3 meters in height and 2.8 meters in diameter. It will operate at 700 °C and have a thermal output of 60 MW, along with 10 MW of electricity. Molten-salt breeder reactors are the most viable designs for thorium fuel, says Charles Forsberg, a nuclear scientist at MIT. In this kind of reactor, thorium fluoride dissolves in molten salt in the reactor's core. To turn thorium-232 into fuel, it is irradiated to thorium-233, which decays into an intermediate, protactinium-233, and then into uranium-233, which is fissile. During this fuel-breeding process, protactinium is removed from the reactor core while it decays, and then it is returned to the core as uranium-233. Fission occurs, generating heat and then steam, which drives a turbine to generate electricity.

But many challenges come along with thorium use. A big one is dealing with the risk of proliferation. When thorium is transformed into uranium-233, it becomes directly usable in nuclear weapons. "It's of a quality comparable to separated plutonium and is thus very dangerous," says Edwin Lyman, director of nuclear power safety at the Union of Concerned Scientists in Washington, D.C. If the fuel is circulating in and out of the reactor core during operation, this movement introduces routes for the theft of uranium-233, he says. Thorium Fuel Charms Nuclear-Power Sector Most groups developing molten-salt reactors are focused on uranium or uranium mixtures as a fuel, at least in the short term. Natura Resources and Abilene Christian University, both in Abilene, Texas, are collaborating on a 1-MW liquid-molten-salt reactor after receiving a construction permit in September from the U.S. Nuclear Regulatory Commission. Kairos Power is developing a fluoride-salt-cooled, high-temperature reactor in Oak Ridge, Tenn., that will use uranium-based tri-structural isotropic (TRISO) particle fuel. The company in October inked a deal with Google to provide a total of 500 MW by 2035 to power its data centers. But China isn't alone in its thorium aspirations. Japan, the United Kingdom, and the United States, in addition to India, have shown interest in the fuel at one point or another. The proliferation issue doesn't seem to be a showstopper, and there are ways to mitigate the risk. Denmark's Copenhagen Atomics, for example, currently aims to develop a thorium-based molten-salt reactor, with a 1-MW pilot planned for 2026. The company plans to weld it shut so that would-be thieves would have to break open a highly radioactive system to get at the weapon-ready material. Chicago-based Clean Core Thorium Energy developed a blended thorium and enriched uranium

(including high-assay low-enriched uranium, or HALEU) fuel, which they say can't be used in a weapon. The fuel is designed for heavy-water reactors. Political and technical hurdles may have largely sidelined thorium fuel and molten-salt-reactor research for the last five decades, but both are definitely back on the drawing table. https://bigthink.com/the-present/why-the-golden-unlock-with-nuclear-power-will-be-mental/

- How to Restart a Nuclear Reactor ›
- Gravity Batteries, Green Hydrogen, and a Thorium Reactor for China ›

- China Says It's Closing in on Thorium Nuclear Reactor ›

Appendix III - 5.55 MW Red Sun POWER BLOCK pro forma 16 gm Am241/Po211/ day…yearly total 5600 gm - total income $15.5 M/ yr

5.55 MW 6 MW RED SUN + 4x AHR + 3 x Opra 16 5.55 MW POWER BLOCK FOR SHIPS

Year	0	1	2	3	4	5	6	7	8
	2025	2026	2027	2028	2029	2030	2031	2032	2033
CAPITAL EXPENDITURES ($1000 USD)									
Equity Investment Capex	−6230								
REVENUES ($USD)									
MWh/yr		36600	36600	36600	36600	36600	36600	36600	36600
PPA Rate ($/kWh)		0.12	0.12	0.12	0.12	0.12	0.12	0.12l	0.12
Am241 + Po211 350d/yx8g/d=(g/yr)		5600	5600	5600	5600	5600	5600	5600	5600
Radioisotope Sales Revenu$2k/16g($/y)		11200000	11200000	1120000	1120000	1120000	1120000	11200000	11200000
Electricity Sales ($) Revenue per PPA		3772000	3772000	3772000	3672000	3672000	3672000	3672000	3672000
Green Tag Rate		0	0	0	0	0	0	0	0

Green Tag Sales Revenue	0	0	0	0	0	0	0	0
Carbon Credits (t) 0.553 tCO2/MWh	20,240	20240	20240	20240	20240	20240	20240	20240
Carbon Credits ($) $24/tCO2 Ave. 2024	485,700	485700	485700	485700	485700	485700	485700	485700
Production Incentive Payments	0	0	0	0				
TOTAL REVENUE	15458	15458	15458	15458	154458	15458	15458	15458
EXPENSES ($1000)								
Operations & Maintenance	445	446.35	447.741	449,173	450,648	452,167	453,732	455,344
Contingency Fund	25	25,5	26,01	26,53	27,061	27,602	28,154	28,717
Project Management Fee	70	71,4	72.828	74.29	75.77	77.29	78.83	80.41
Insurance	21	21.42	22	22.3	22.7	23.2	23.65	24.12
Property Tax	99	99	99	99	99	99	99	99
Leaseholder Payments 48 mo	248	248	248	248	248	248	248	248
Admin/Financial/Legal Management	5	5,1	5,202	5.31	5.41	5.55	5.63	5.74
Production Tax Expense	12.1	12.2	12.5	12.8	12.9	13.0	13.2	13.3
Warranty Expense	20	20.4	20.81	21.22	21.65	22.3	22.87	23.47
Shipping costs of radioisotopes	35	35	35	35	35	35	35	35
Personnel	320	320	320	320	320	. 320	320	320
purchasing night hydroelec	900	900	900	900	900	900	900	900
Annual total Opex	2204	2204	2204	2204	2204	2204	2204	2204
EBITDA & Taxable Income ($1000 USD)								
EBITDA	13254	13254	13254	13254	13254	13254	7654	. 7654
Depreciation	625	625	625	625	625	625	625	625
Debt Interest Payment	253	253	253	253	253	253	253	253
Total Annual Expenses	3082	3082	3082	3082	3082	3082	3082	3082
Income								
Accumulated	10252	20504	30756	41000.	51260	61512	71764	. 82016

Taxable Income	10252	10252	10252	10252	10252	10252	10252	10252
Return on Investment %	164%	328%	492%	656%	820%	981%	1140%	1320%

TAXES

Appendix IV - Redstar JVs: Redstar is nuclear advisor to *DOE* and *Office of the President*. And, Redstar is the 11th utility company of the Philippines (1st utility co in 49 years). *REDSTAR* has jvs: A. DOE B. NATIONAL POWER CORP C. DEPT OF ECOLOGY & D. NATIONAL RESOURCES (DENR) E. LAGUNA LAKE DEVELOPMENT AUTHORITY.

Appendix V - Studies, Reports and Articles:
Two Nuclear microreactors reach milestones; Westinghouse Evinci~
https://spectrum.ieee.org/microreactor

AHR Cost Studies:
https://fluidfuelreactors.com/1958-ffr-ch10-homogeneous-reactor-cost-studies.php

AHR Quarterly Progress Report
https://digital.library.unt.edu/ark:/67531/metadc100444/m1/8/
Dozens of countries back flat rate carbon levy proposal for Shipping up to $150/tCO2:
https://www.rivieramm.com/news-content-hub/news-content-hub/dozens-of-countries-back-flat-rate-carbon-levy-proposal-for-shipping-83492

Nuclear or *Pink Hydrogen* qualifies as green energy and can receive full $3.00/ kg *hydrogen production credits* in US:
https://finance.yahoo.com/news/nuclear-energy-stocks-rise-final-153612708.html

JCB hydrogen Engines approved for sale:t
https://fuelcellsworks.com/2025/01/10/energy-policy/jcb-hydrogen-engine-approved-for-sale-and-use
https://www.powerprogress.com/news/jcb-puts-hydrogen-combustion-into-action/8027889.article
JCB Hydrogen Excavator:
https://jcbcea.com.au/2020/07/jcb-leads-the-way-with-first-hydrogen-fuelled-excavator/ *JCB H2 Engine* https://youtu.be/nNsmVYlULbA

Production of Polonium 208, 209, and 210 for nuclear battery production via particle accellerator:
http://dx.doi.org/10.1007/s00339-020-03557-8

OPRA Op 16 Data Sheet- Specs:
https://energy-xprt.com/products/opra-model-op16-3a-gas-turbine-generator-306868

AHR designed by Nobel Prize winner *Eugene Wigner* at *ORNL*:
https://www.ornl.gov/news/nuclear-lab-peacetime

IRA $3/ kg US H2 tax credit goes through..:Norway gets $200 M subsidy
https://www.hydrogeninsight.com/electrolysers/nel-awarded-29m-in-us-tax-credits-for-proposed-green-hydrogen-electrolyser-gigafactory-in-michigan/2-1-1763513

Cummins makes a new turbocharger for hydrogen

https://www.motor1.com/news/748071/cummins-turbocharger-hydrogen-engines/

Nuclear reaction processes are used for the production of energetic ^{208,209,210}Po nuclei from Pb and Bi targets with particle accelerators (with 16 small accelerators from AHR core with 8 in 360 ° circumference absorbing neutrons), instead of the production with a nuclear reactor, for use in the nuclear battery and radioisotope thermoelectric generator technologies. The cross-section curves, simulated activity and yields of product of each reaction process were calculated under particular conditions, including 24 h of irradiation with a particle beam current of 1 mA for the energy range Eparticle = 200 → 1 MeV. Based on the calculated and simulated results, to produce ^{208,209,210}Po nuclei, the appropriate target nuclei, nuclear reaction processes, and energy region of reactions.
. Electric car sales Collapse:
https://community.oilprice.com/topic/34009-e-car-sales-collapse/