

RED SUN Energy Systems



Ship Fuel Use cost per nautical mile at \$0.70/kWh fuel cost = 42 gal/nm x 12,700 nm x 1 MT/ 315 gal x \$1500 / MT = \$2.5 mln USD per round trip (rt) - Long Beach to Manila! 44,000 MJ/ MT x 0.15 MT/ nm x 12,700 nm x 278 kWh/1000 MJ= 23,300,000 kWh = 23,300 MWh = \$2,500,000/ 12,700 nm = **\$197/ nm**

Large cargo ships typically consume about 1 barrel (42 gallons) of fuel per nautical mile, while massive cruise ships can burn up to 30–50 gallons per mile. Fuel consumption is highly dependent on speed and vessel size, with a 33% reduction in fuel possible by reducing speed, such as through slow steaming.

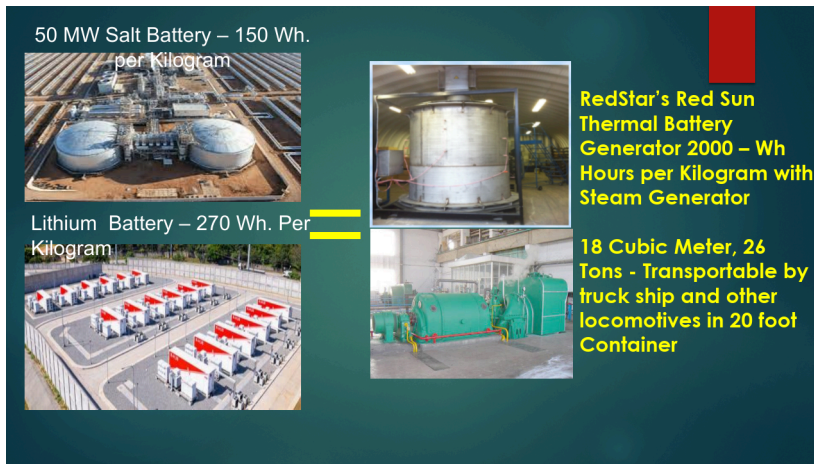


Red Sun Costs: for same trip is $\$0.15/\text{KWh} = 0.15/0.70 \times \$2.5 \text{ mln} = \$536\text{k}$, or only 20% of the cost, saving \$2 million per trip, of which \$1 mln would go back to owners per ship in Efficiency savings contract; and; pay for \$5 million retrofit in 5 trips! Destroyers use 1000 Gal/ hour!

Very Large Cargo Ships: _____ Key Fuel Consumption Figures:

- Large Container Ship (approx. 8,000 TEU): Can consume roughly **225 tons of fuel per day at 24 knots**, or about **150 tons per day at 21 knots**.
- Cruise Ships: Generally use 140–150 tonnes of fuel per day, with high speeds causing higher consumption rates.
- Large Tanker/Cargo: Often burn roughly 1 barrel (42 gallons) of fuel per mile.
- Efficiency Metric: Some large ships see efficiency improvements, with one example stating that modern ships can move 1 nautical mile while consuming around 122.8 gallons, based on specific engine types.
- **Long Beach- Tokyo:** 11,000 mile round trip is $\$1500/\text{MT} \times 122.8 \text{ gal/ nm} \times 11,000 \text{ nm} \times 1 \text{ MT/ 315 gal} = \6.4 million for 11,000 nautical miles. This

takes 524 hours at 21 knots = 21.8 days. Thus \$6.4 mln/ 21.8 days = \$294,000 per day on fuel at current diesel costs, vs **Red Sun** at **\$60k/day** x 22.8 day = \$1.3 million for savings of **\$4.1 mln/trip**



Factors Influencing Fuel Use per Mile:

- Speed: Fuel consumption increases exponentially with speed.
- Size and Load: Larger, heavier ships require more fuel.
- Weather: Wind and sea conditions can increase consumption. Cost to run diesel electric train at 26 c/ kWh and \$ 1250/ MT fuel diesel

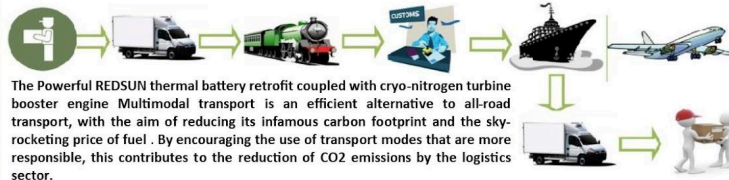
Based on a diesel price of \$1,250 per Metric Tonne (MT), the estimated fuel cost to run a diesel-electric train ranges from roughly \$3.50 to over \$10.00 per kilometer, depending on load, terrain, and speed. \$1.10–\$1.20 per liter (depending on diesel

density of roughly 0.84–0.87 kg/L).



Passenger Transport and Freight Train simultaneously in one rail is economically and socially viable system

Multi-Modal Transport Operator



New Markets reached by Transforming roads & rail into power corridors

GE Transportation is to develop a battery version of its AC-motored Evolution Series locomotives with 2 400 kWh of onboard energy storage and an energy management system. The prototype is to be tested on BNSF freight trains between Stockton and Barstow, working in multiple with diesel locomotives, and is predicted to reduce the train's total fuel consumption by 'at least 10% to 15%'. 'This project will give us tremendous insight into the capabilities of battery power and the best operational methods of leveraging the technology,' which is expected to cost around \$45 million for this locomotive!

Battery-Electric Locomotive

Massive power generation capabilities up to **2400 kWhrs**
Huge fuel savings of at least **10-15%**

Vs. Mag Power Wireless Electric Train Retrofits

Vs. RED SUN 32 MW Thermal Battery = 65,000 kWh
Fuel savings of 94%– 64 MW – weighs 60 tons = 130MWh on Budd car-110 tons
Range of 1400 km to 2100 km- Electric Locomotive Retrofit - \$1.6 mln+ Bat cost
Charge-up with Mag Gas cost 1c/kWh = \$650 USD – 4-6 hr+onboard Recharge
Onboard Charge-up 2x's while running: Induction + MAG GAS genset charger

Train Fuel Consumption Rates:

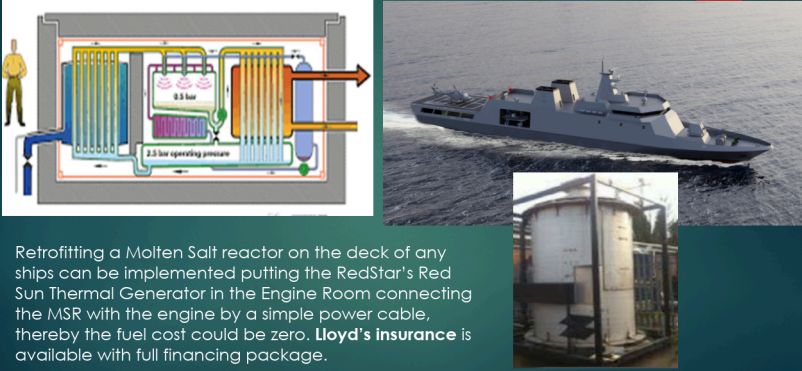
- Freight Train (Loaded): v to 6 liters per km. Passenger Train: ~3 to 5 liters per km.

Calculated Diesel/ Electric Fuel Cost:

Heavy Freight = $10.35 \text{ L/ km} \times \$1.25/ \text{ L} \times 3200 \text{ km}$ Laguna - Bicol = \$41,400 per trip

$44 \text{ MJ/ kg} \times 10.35 \text{ L/ km} \times 3200 \text{ km} \times 0.278 \text{ KWh/ MJ} \times 0.87 \text{ kg/ L} = 405,000 \text{ kWh/ Round Trip}$

<https://www.youtube.com/watch?v=dEUxEZ2sfUM>



Retrofitting a Molten Salt reactor on the deck of any ships can be implemented putting the RedStar's Red Sun Thermal Generator in the Engine Room connecting the MSR with the engine by a simple power cable, thereby the fuel cost could be zero. **Lloyd's insurance** is available with full financing package.

Train retrofitted with two Red Sun 32 MW thermal batteries on Bud car = \$5 million with 6 yr old GE Loco

RED SUN COST = $405,000 \text{ kWh/ rt} \times \$0.15/ \text{ kWh} = \$60,700$ per 3200 km round trip = $\$60.700/ 3200 = \19 per km.

1 Metric Ton is approximately 270 gallons or 6.4 barrels of heavy fuel oil.

What is the Fuel consumption of a cargo ship? -

May 9, 2021 — A good general rule is that cargo ships burn about 1 barrel of fuel per mile. A barrel is 42 gallons and a nautical mile is 6076 feet.



Yacht Fuel | What You Should Know About Efficiency - YATCO

Jun 4, 2025 — Medium sized yachts (40–80 feet) typically consume 20–80 gallons per hour depending on cruising speed and yacht engine configuration. Superyachts

(100 feet and ...



Conclusions:

This fuel cost breakdown for larger ships & trains vs Red Sun thermal pneumatic systems show Red Sun saves more on very large power systems averaging 80% saving of fuel costs, depending on eight charging systems available. The fuel costs are averaging \$150k per day on cargo and cruise lines running diesel. Whereas Red Sun fuel efficiency contracts split 50% owner/ 50% Redstar can save \$2 million per trip for ships and \$30k per day for freight trains, paying off retrofits in months...the hybridization of electric axial motor high torque technology with AI driven Hydrofoiling run by **PowerSource 660 kW** or **1320 kW** for 25kt+”ships. Red Sun e2 MW (26t, 18 m3; and 360 MWh/ charge - day) also retrofits all existing diesel or turbine propulsion & power up to 300 MW in series. Insured by **Lloyd's Syndicate, with a 40-year lifespan.**



Yamaha 150 kW - Electric Outboard is 98% efficient and high torque. **Powered by PowerSource 660** gives $723 \text{ kWh/charge} \times 2 \text{ kWh/km} = 361 \text{ km range}$ & **low-weight**