Cargo Liner Energy Alternatives and Regulations

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Advised by Professor Geoffrey Pfeifer and Professor David Medich

The Shipping Industry
46,000 Merchant Ships
90% Of World Trade
19,000 Ships Retiring
40% Of World Fleet

Greenhouse Gas Emissions
800 Million Tonnes CO₂
2% Of Global Emissions

Projected Change in Emissions from Shipping

<table>
<thead>
<tr>
<th>YEAR</th>
<th>-100%</th>
<th>-50%</th>
<th>0</th>
<th>50%</th>
<th>100%</th>
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<tbody>
<tr>
<td>2010</td>
<td></td>
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<tr>
<td>2020</td>
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<td>2030</td>
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<td>2040</td>
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<td>2050</td>
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Health Effects
- Lung Cancer
- Asthma
- Heart Disease
- Premature Death

Steps We Took
1. Researched Different Fuel Alternatives
2. Analyzed Regulations and Emissions
3. Decided to Pursue Nuclear Energy
4. Focused on Thorium Molten Salt Reactors

Safety
Passive Safety Features
Fuel Drain Tank

Thorium Molten Salt Reactors
- CORE
- Fuel Processing
- Energy Generation
- Removes Gasses
- Removes Fission Products
- Reaction Heats Salt
- Emergency drain plug prevents overheating
- High operational temperature
- High Energy Efficiency

Environment
Recycling

Cost
Price of Energy
(Cents Per Kilowatt Hour)

Thorium Around the World
(Thousands of Tonnes)

<table>
<thead>
<tr>
<th>Region</th>
<th>Thorium</th>
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<tbody>
<tr>
<td>Asia</td>
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<tr>
<td>North America</td>
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<td>South America</td>
<td>853</td>
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<td>Africa</td>
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Implementation
Development
Licensing
Regulations
Mining Thorium
Install on Ships

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References

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