Cash for Floating Clunkers

A Gigatech Solution for our Teraton Problem

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What problem(s) are we trying to solve?
Net zero energy emissions is not enough!
We need net zero impact
*Covid 19 was a warning shot about the 6th great extinction!*
Sustainable solutions require creation of virtuous cycles – *Energy transition programs are not doing this… yet.*
We need global investment of $1.5 trillion/year in decarbonization of coal, oil, & natural gas (CONG) must be left in the ground, and 1 trillion tons of CO2 must be removed from the atmosphere and the oceans.

380 ppm atmospheric CO2 in 2009 was the tipping point for ocean health...

IMO regulations on cleaner shipping have created an opportunity for MARES Arks using prematurely retired ships!

Source: Vaclav Smil (2017) & BP Statistical Review of World Energy OurWorldInData.org/energy • CC BY
Majuro Energy Company
Climate Proof Tank Farm
ADB is funding tank farm rehabilitation... an interim solution

Long-term solution is a floating tank farm with a used tanker
(you won’t even know it’s there)
Cash for Floating Clunkers (CFFC) Business Case

IMO Compliance market:
- 40% CO2 reduction by 2030
- 70% reduction by 2050
- Global fleet of 50,000+ vessels

BAU: ships go to scrapyards
- $5 million salvage value for a Panamax

CFFC: retire ship 10 years early
Typical Panamax vessel:
- 10 years avoided fuel = 1 million tons avoided CO2e
- New ship complies with IMO 50% CO2 reduction
- **0.4 million tons net avoided CO2e**
- Monetize @ $50/ton CO2e = **$20 million per ship**

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Need energy transition funds to get started
CFFC Retrofit for MARES Ark Operations / “Power to X”

Floating tank farm

Solar-powered aquaculture

Reef cultivation

Blade-less wind energy

Deep-water intake pipe for no-feed multi-trophic aquaculture
(design for future expansion to accommodate OTEC)
Valuation Scenarios – RMI / MEC Proposal

**Valuation to Shipowner**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>NPV 3%</th>
<th>NPV 5%</th>
<th>NPV 7%</th>
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<tbody>
<tr>
<td>BAU</td>
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<td>Donation</td>
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<td>Negative salvage</td>
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<td>Other</td>
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**Valuation to MEC**

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**BAU** = business as usual. Ship is sold for scrap. No early retirement and no CO2 monetization.

**Donation** = Ship owner donates tanker to MEC for $0, and takes half of the CO2 credits monetized @ $50/ton.

**Negative Salvage** = ship owner pays MEC the salvage value to take the tanker. MEC / RMI takes all CO2 credits for monetization.

**Other** = ship owner pays MEC the salvage value and takes all the CO2 credits.

**BAU** = business as usual. MEC continues to operate onshore tank farm. No change in climate risk scenario.

**Donation** = MEC gets the tanker and half of the CO2 credits monetized @ $50/ton

**Negative Salvage** = MEC receives salvage value in cash and monetizes CO2 credits.

**Other** = MEC receives the salvage value and foregoes any carbon credit funds.
MARES Arks Program Funding & Financial Flows

Step 1: Program Definition
Consulting services for program development / management

Step 2: Resource Assessment
Resource mapping and project structuring for 1st contract area

Step 3: Deal Structuring and "round 1" investment in Special Purpose Vehicle
1st contract area auctioned / transferred to investors for implementation (SPV)

Step 4: Replication & Scale-up with "round 2" investment (SPV)
Scale up in 1st contract area & replication in other contract areas

 MDB / other donors: $X M grant (reimbursable)

3rd party Investors: $YY M pre-payment
Grant refunded to MDB / others

3rd party Investors: $ZZ M “round 1” *
Royalty payments to government

3rd party Investors: $?? M “round 2” *

Gross revenue to investors

* MDB direct support to investors and/or to SPV
MARES: “Just Add Money”
Need to leverage $25 – 50 Billion investment in Asia-Pacific to achieve $1 Trillion/year globally

If you think it’s too expensive…
… you can have a dead planet at no extra charge

Thank you!
Issues
The war on biodiversity and climate change will be won or lost in the oceans!

- Multilateral development banks (MDBs) and other donors need to double down on the new ocean economy with increasing focus on monetizing offshore renewable energy (ORE).

“Iceberg” Challenge #1:
- global electricity accounts for only ~ 23,000 TWh/y vs. total energy consumption of ~ 175,000 TWh/y
- Get out of the PPA box and support solutions to monetize ORE via “power to X” business models which help restore ocean health and enhance ecosystem services.

Source: REN21 2022
% of global final energy use by sector, cooling and transport electricity reallocated.
Floating offshore wind is required for global net zero...

“Iceberg” Challenge #2:
• 3-blade horizontal axis machines require an “iceberg” structure for floating operation

Duck tape design approach #1:
• More than 6000 MW of wind turbines in India are > 15 years old, mostly 300 kW class turbines which can be refurbished and redeployed on floating clunkers
• Add deep-water intake pipe for no-feed regenerative marine aquaculture… and possibly / eventually OTEC
Duck tape design approach #2 –

*Floating clunkers can be retrofit with*

- Solar PV
- Blade-less wind generation
- In-stream tidal conversion
- Cold water intakes for no-feed marine aquaculture…
  …which can be extended for OTEC
More duck tape:  
PROVEN TECHNOLOGY FOR FLOATING OTEC SYSTEMS

• US Department of Energy’s OTEC-1 project in early 1980s successfully proved the main elements of a 1 MW scale floating OTEC system utilizing a converted 160 m long redundant tanker (US Navy WW2 vintage) [about the same size as a typical Panamax-class ship – one of the most common vessels in the global fleet subject to IMO regulations.]

• In particular, the OTEC-1 project proved the feasibility of horizontal launching, towing, and mating of the intake pipes to the ship, and later disconnecting those pipes.

(OES, 2021)
Deep Ocean Water (DOW)

Surface Water

Hydrogen

Potable Water

Mineral Water

DOW Ice

Lithium

Power Supply

Fresh Water

Reuse of DOW

Desalination

Electricity

Surface Water

Deep Ocean Water (DOW)

Seawater space cooling

Offshore vertical farming

Regenerative Aquaculture

Floating OTEC = The Holy Grail of Renewable Energy

MARES Ark = multiple revenue streams from multiple products while growing natural capital!
IMO compliance market: reverse cash for clunkers + wrecks-to-reefs (W2R)
Globally there are more than 1900 W2R sites of which more than 1700 are in US waters. 27 of ADB’s DMCs can have a wrecks-to-reefs program (other DMCs could buy in…).

- Ultimately the MARES arks are sunk for use as breakwaters & reef cultivation – possible adaption credit??
- 0.44 tons CO2 are stored in each ton of CaCO3 -- additional CO2 mitigation credits?
- W2Rs serve as anchoring/mooring points for dive boats, floating solar & wind, marine aquaculture, etc.