Cash for Floating Clunkers

A Gigatech Solution for our Teraton Problem

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What problem(s) are we trying to solve?

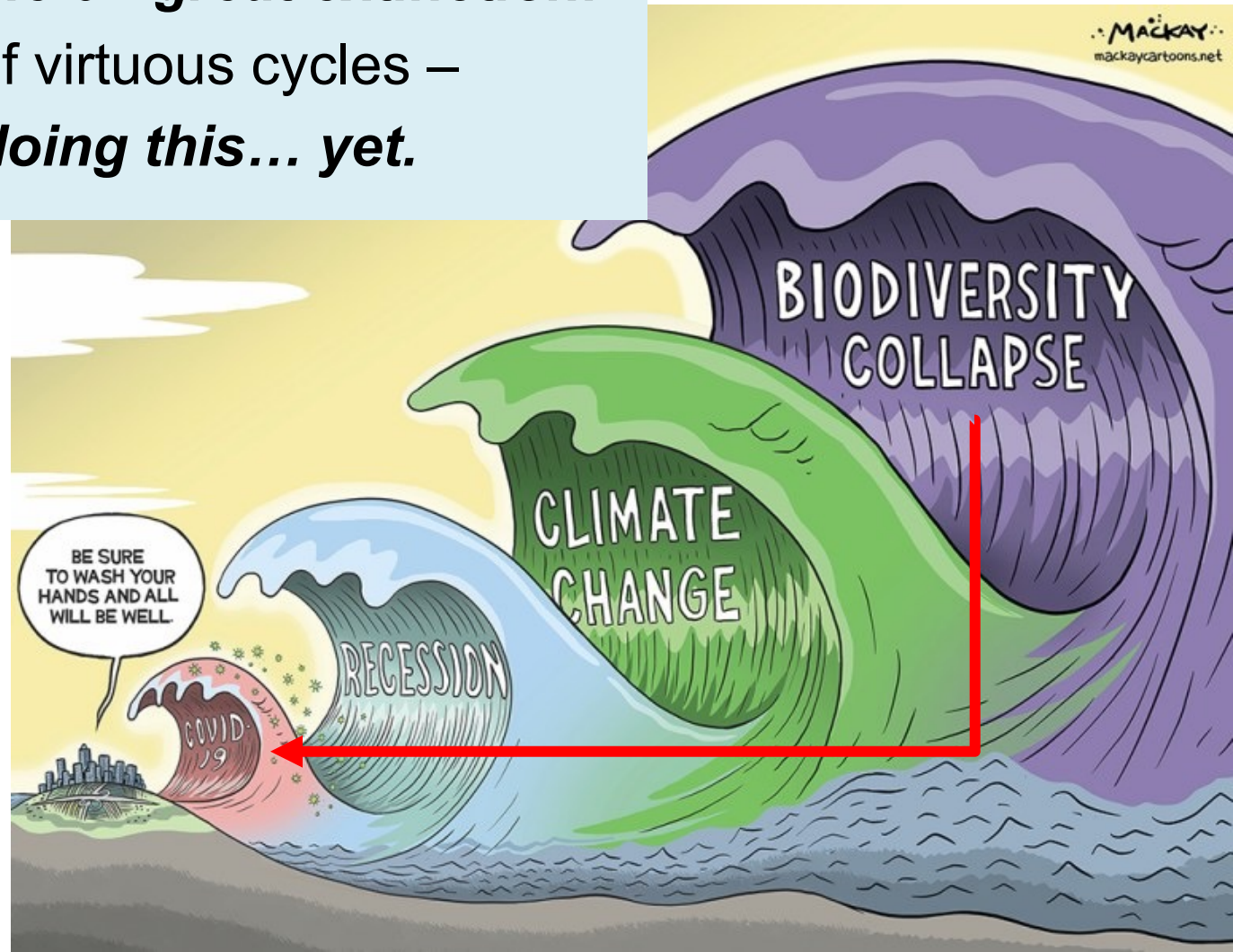
Net zero energy emissions is not enough!

We need net zero <u>impact</u>

Covid 19 was a warning shot about the 6th great extinction!

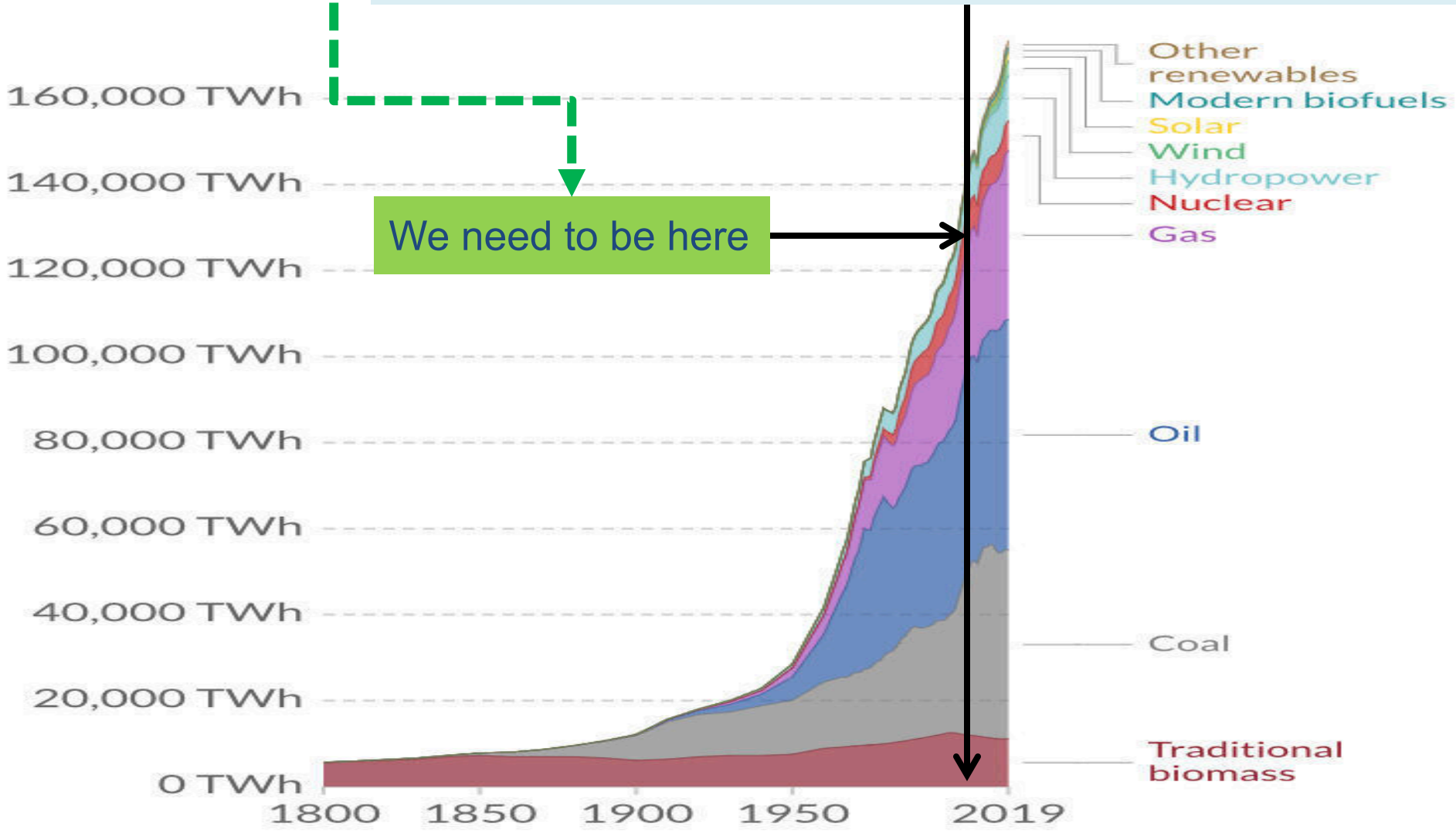
Sustainable solutions require creation of virtuous cycles –

Energy transition programs are not doing this… yet.



We need global investment of $1.5 trillion/year in decarbonization

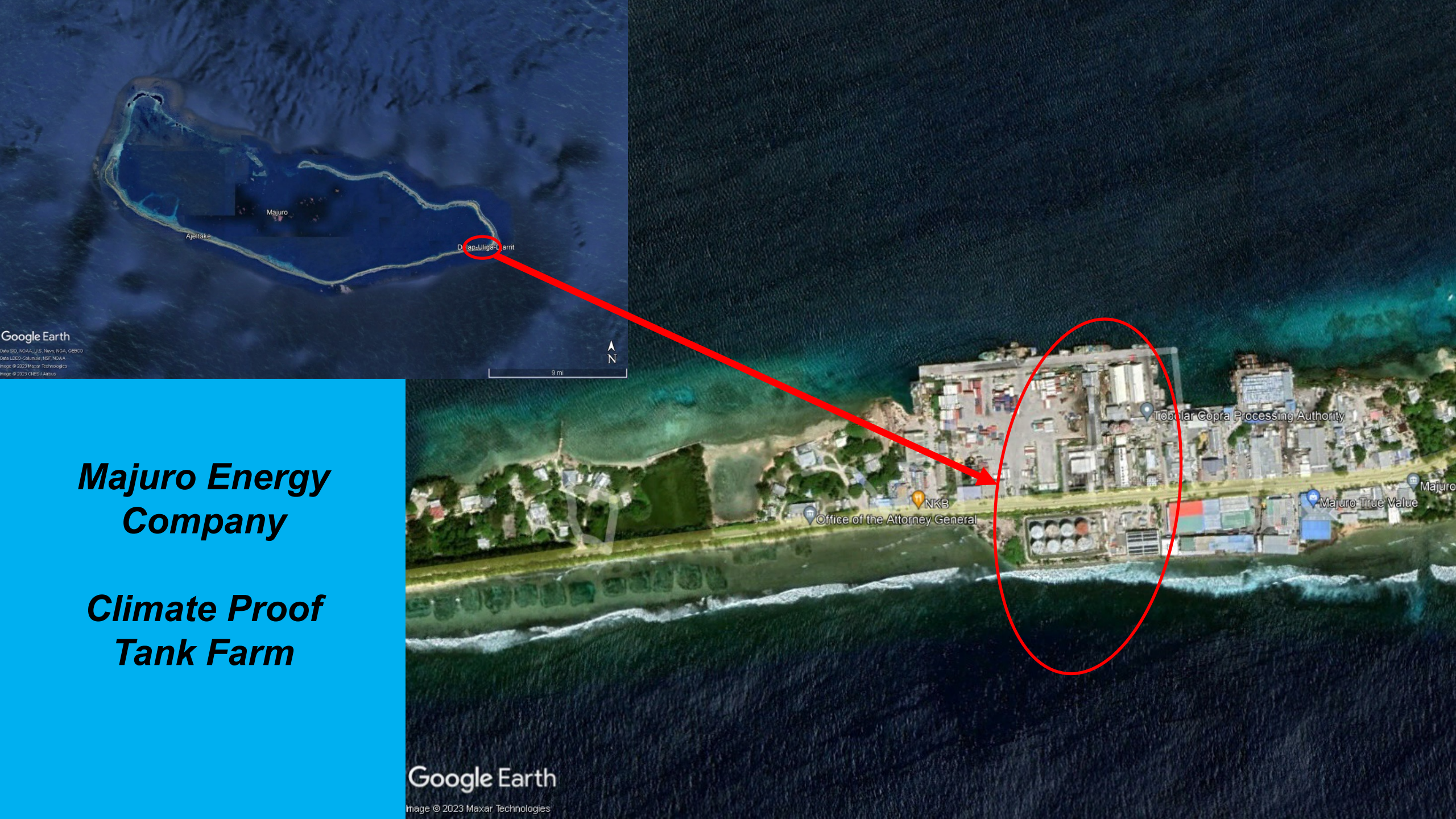
380 ppm atmospheric CO2 in 2009 was the tipping point for ***ocean health***…



Source: Vaclav Smil (2017) & BP Statistical Review of World Energy
OurWorldInData.org/energy • CC BY

… 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.

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



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 <u>used</u> 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

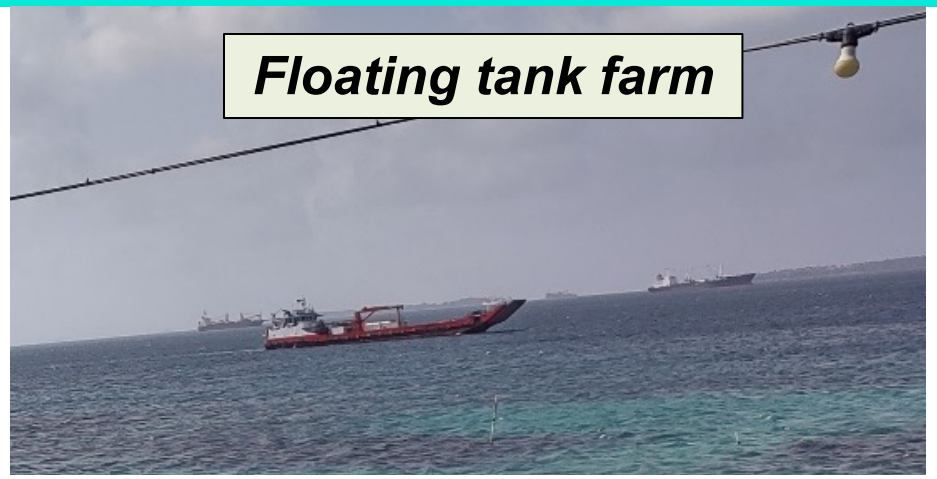
CFFC: retire ship 10 years early
Typical Panamax vessel:

- 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**

❖ ***Need energy transition funds to get started***

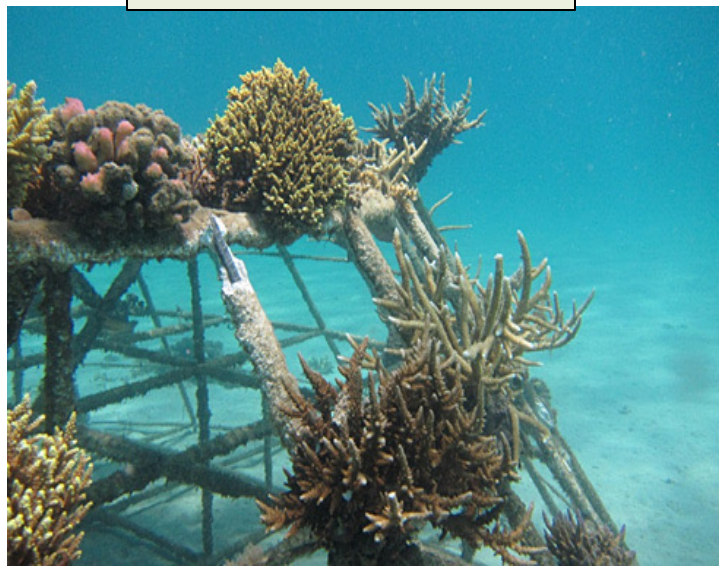
CFFC Retrofit for MARES Ark Operations / “Power to X”

Floating tank farm



Solar-powered aquaculture

Reef cultivation

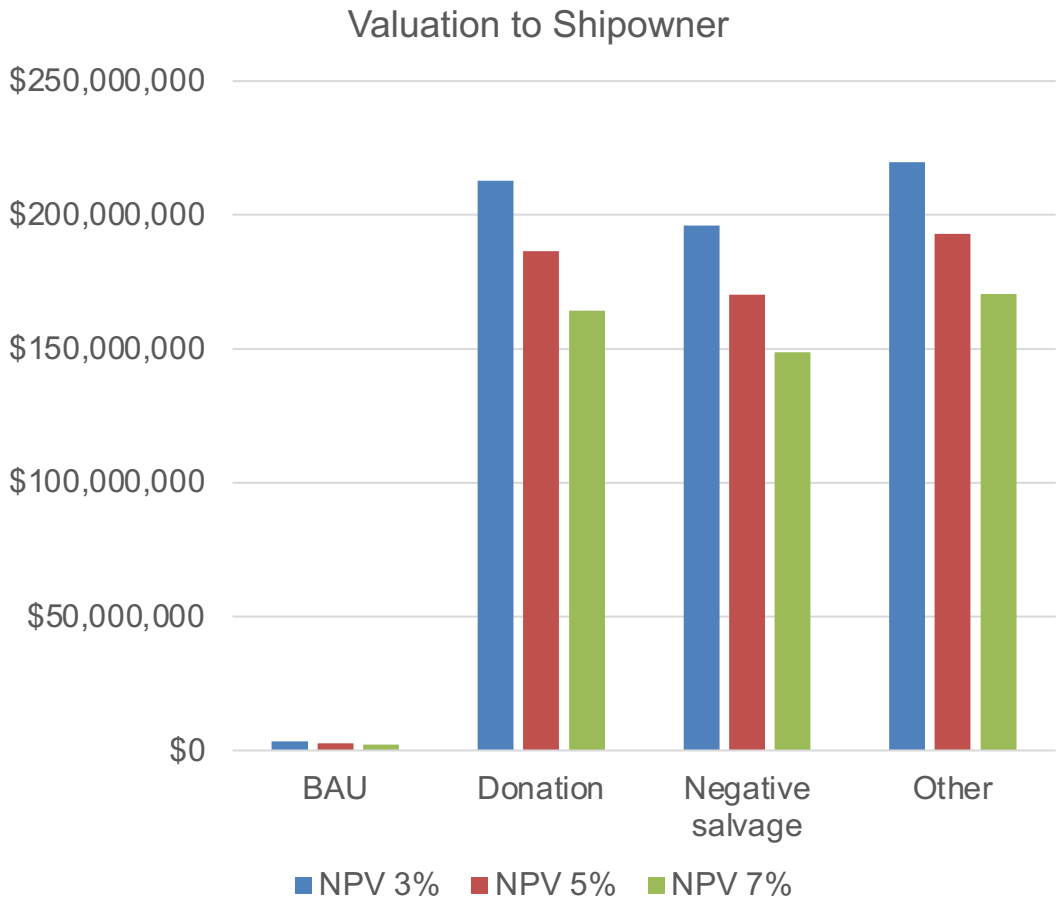


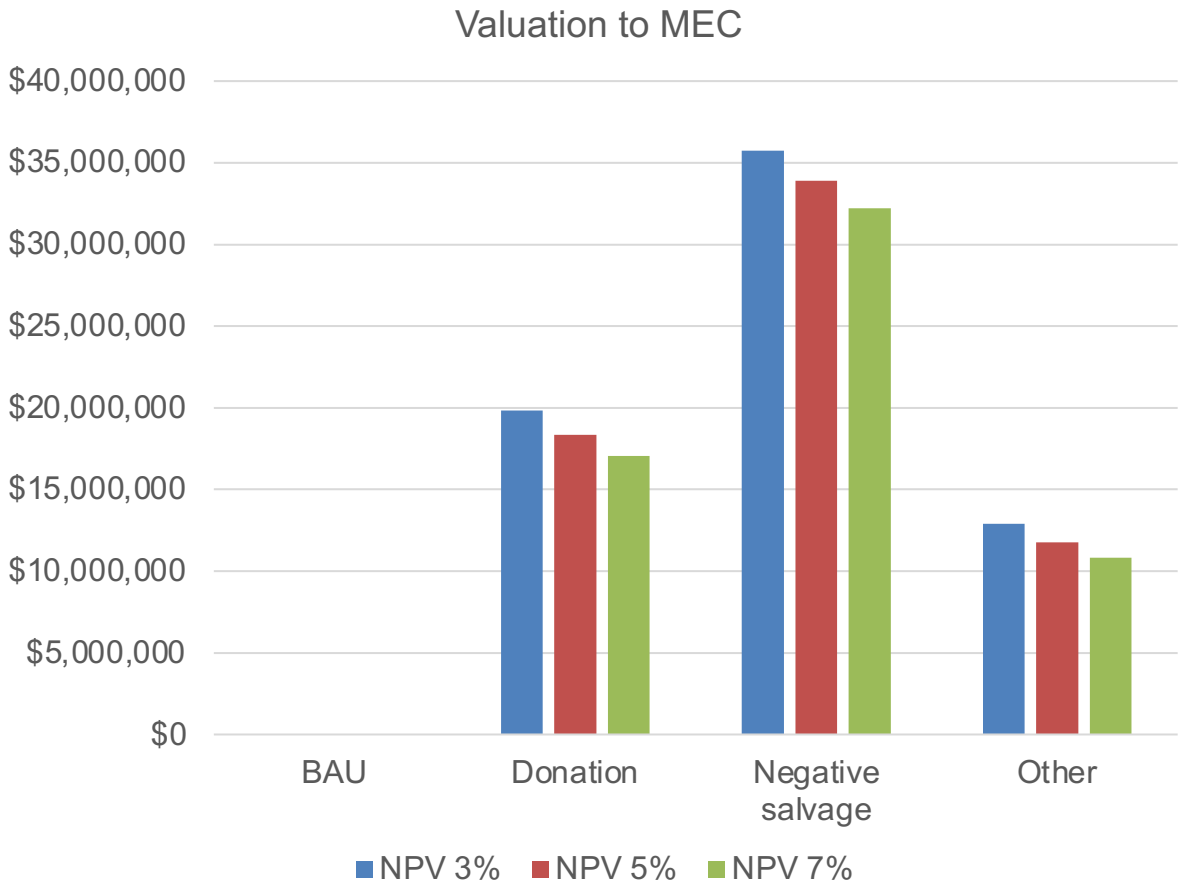
Blade-less wind energy

Deep-water intake pipe for no-feed multi-trophic aquaculture

(design for future expansion to accommodate OTEC)

Valuation Scenarios – RMI / MEC Proposal

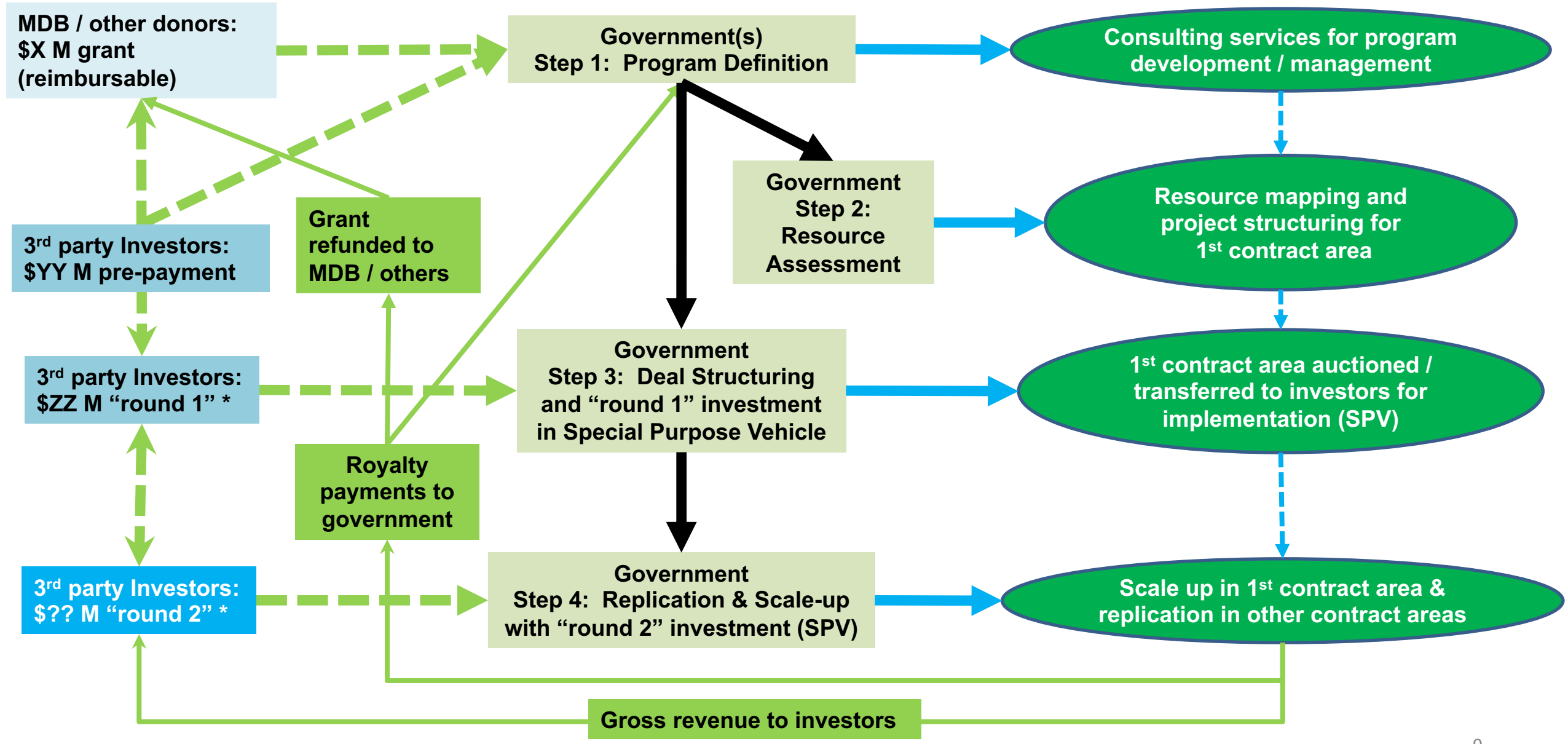




BAU = business as usual. Ship is sold for scrap. No early retirement and no CO2 monetization.
Donation = Ship owner donates tanker to MEC for $0, and takes half of the CO2 credits monetized @ $50/ton.
Negative Salvage = ship owner pays MEC the salvage value to take the tanker. MEC / RMI takes all CO2 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



* 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).*

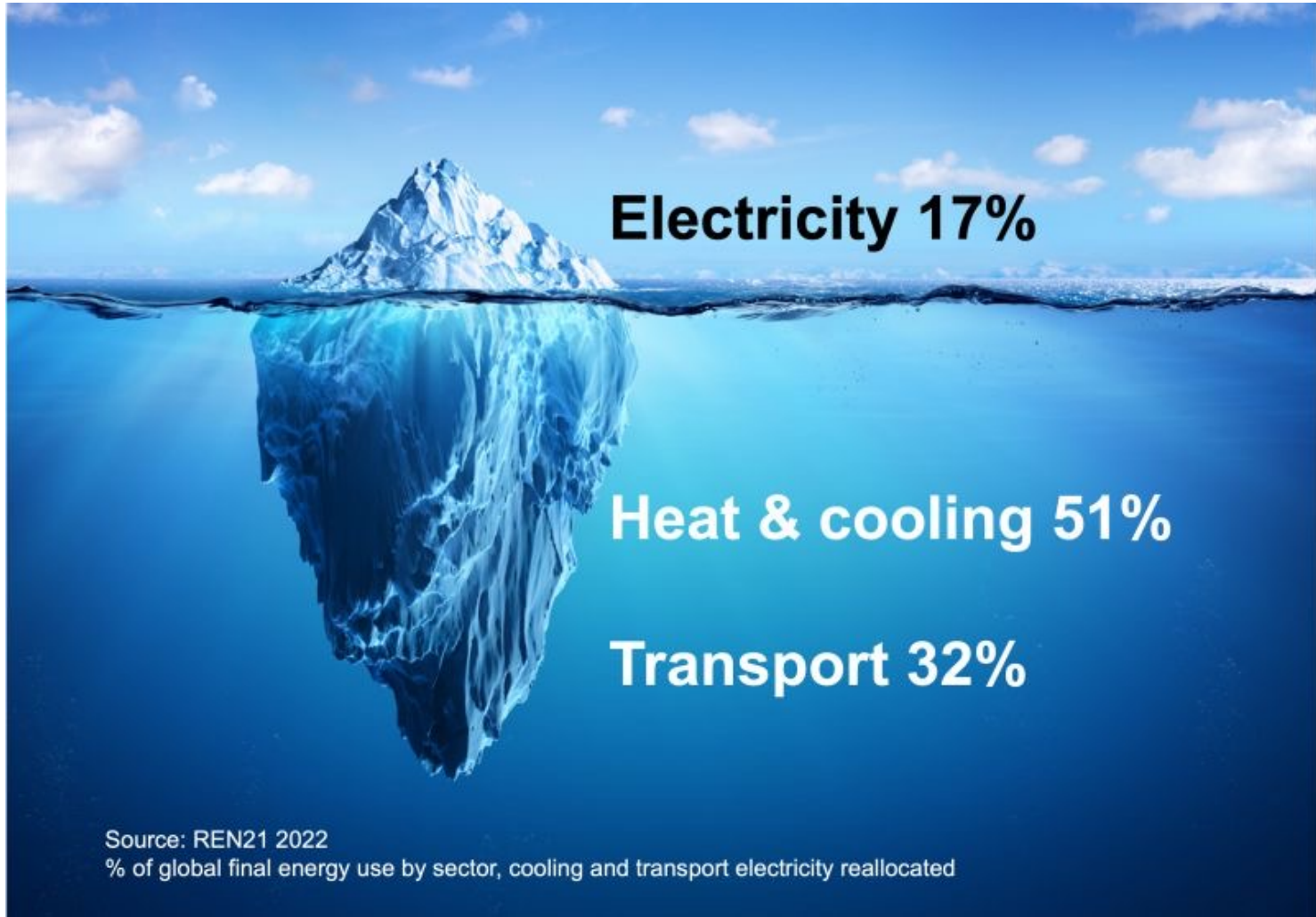
"Iceberg" Challenge #1:

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.*



<u>Floating</u> offshore wind is required for global net zero…

“Iceberg” Challenge #2:

- ***3-blade horizontal axis machines require an “iceberg” structure for floating operation***

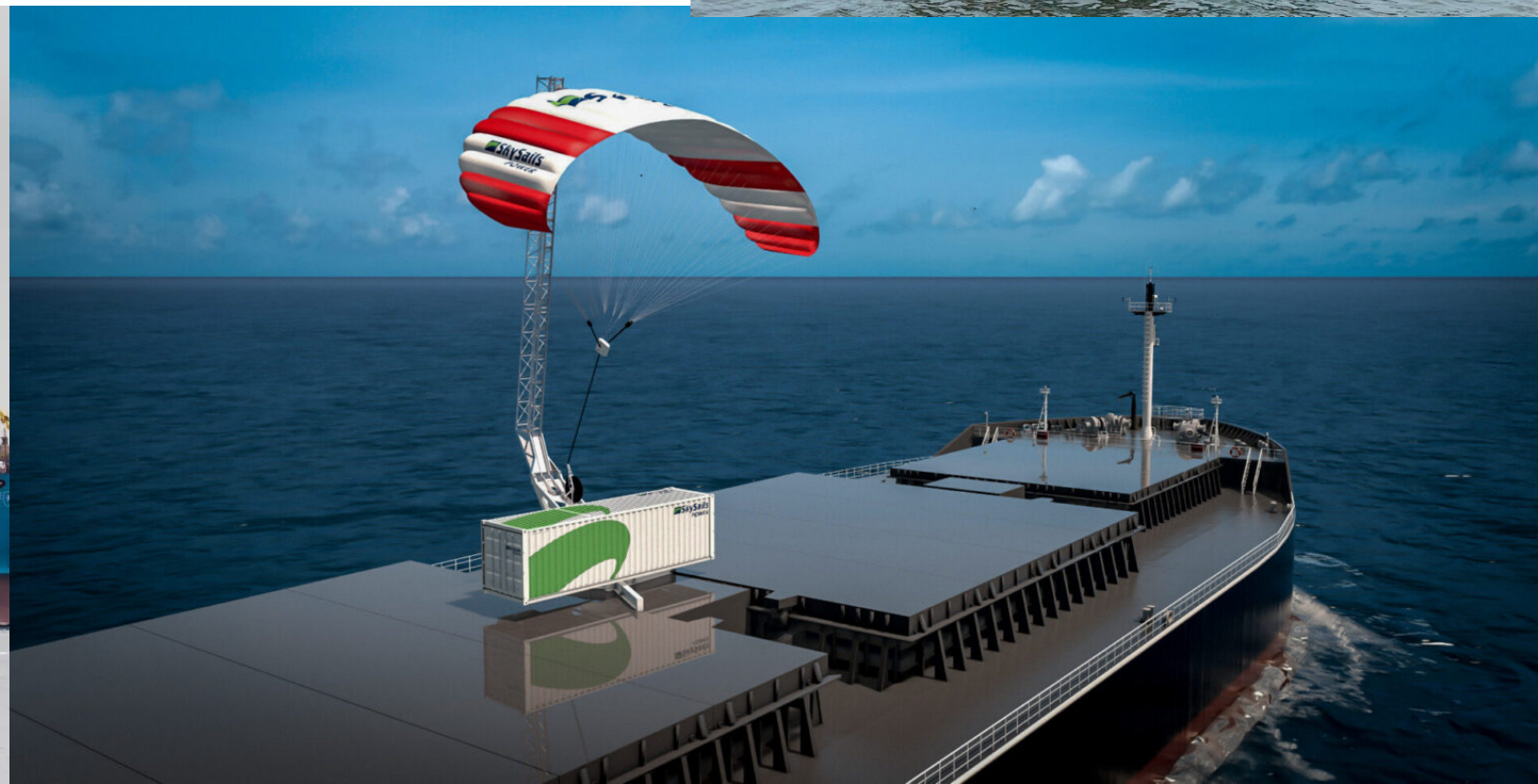
Duck tape design approach #1:

- 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

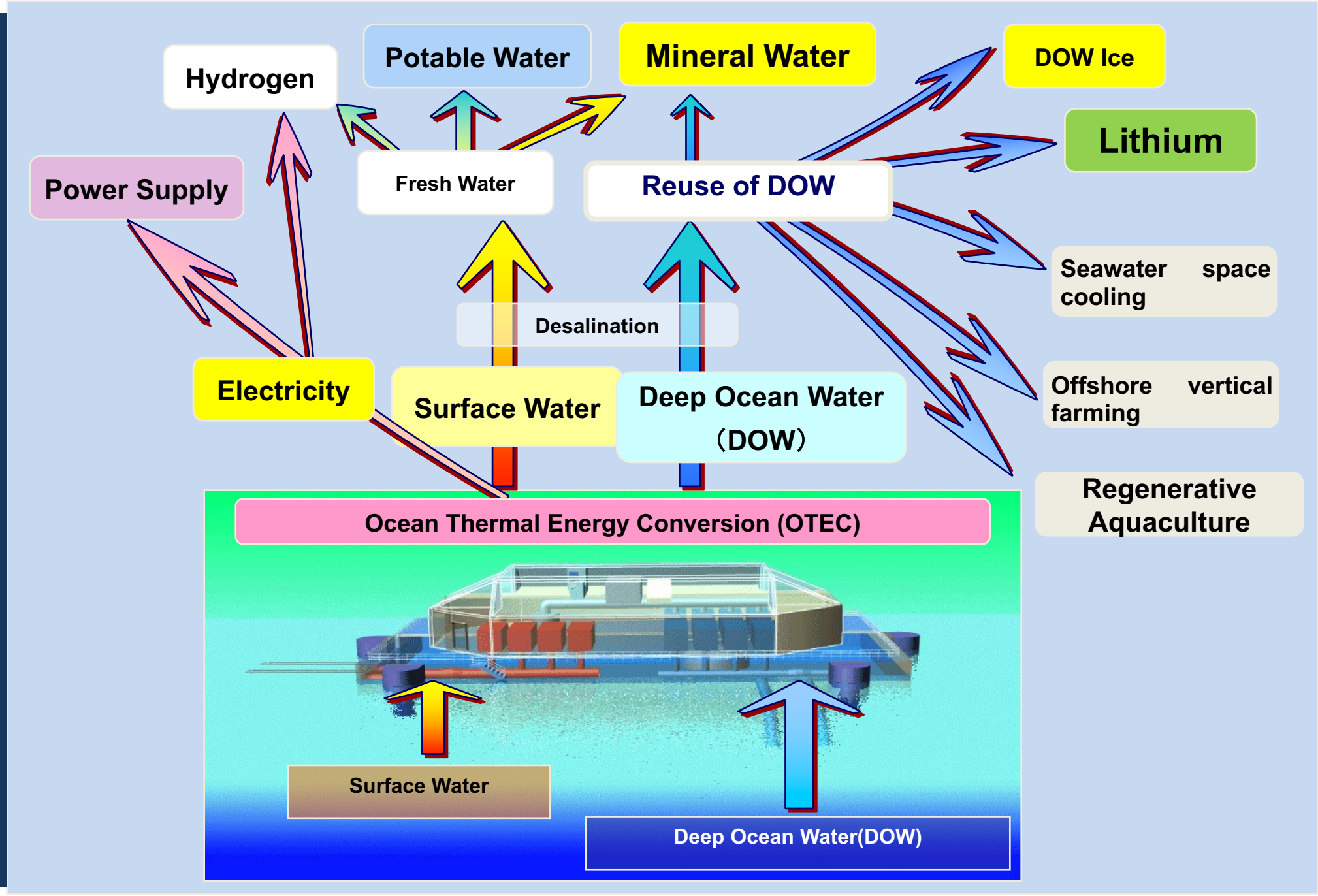
- US Department of Energy's OTEC-1 project in early 1980s successfully proved the main elements of a 1 MW scale floating OTEC system utilizing a converted 160 m long redundant tanker (US Navy WW2 vintage) [about the same size as a typical Panamax-class ship – one of the most common vessels in the global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

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 CO_2 are stored in each ton of $CaCO_3$ -- additional CO_2 mitigation credits?
- W2Rs serve as anchoring/mooring points for dive boats, floating solar & wind, marine aquaculture, etc.

USS Oriskany – the "Great Carrier Reef"