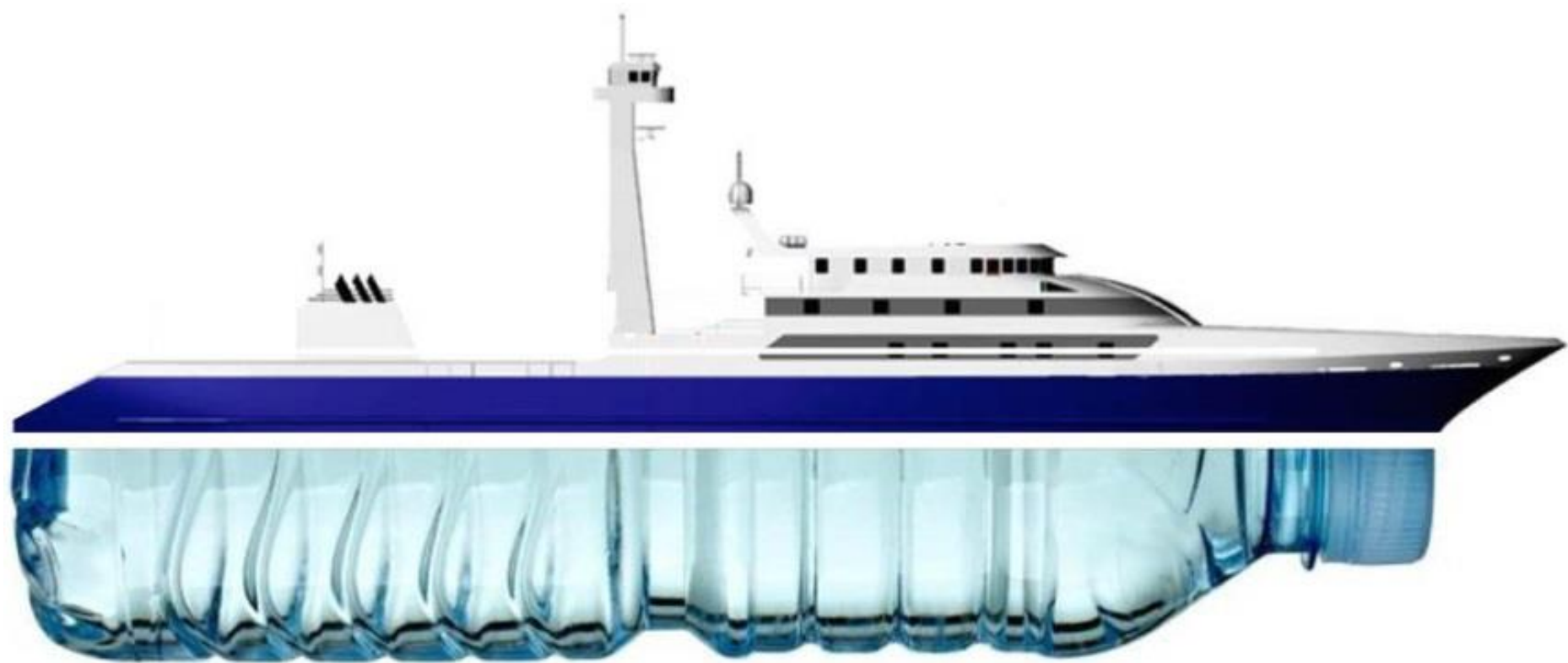




Cleanership





Marine Plastics

- 200 million tonnes of plastic produced annually
- 8 million tonnes enters the sea each year
- 150 million tonnes of plastic in the sea total
- Doubles in the next 20 years

15 tonne truck-load per minute enters the sea



Oceans and Plastics Platform
Facts, Impacts and Solutions to Plastics in the Marine Environment

PlasticOceans
The Environmental Impact
Annually, approximately 100 billion plastic bags are used worldwide. More than one million bags are used every minute.
Plastic Pollution has become a man-made global catastrophe

GPA
Global Partnership on Marine Litter

Many organizations work on this problem

PlasticOceans
IS THIS YOURS?

THE LARGEST CLEANUP IN HISTORY

5 Gyres: Working to Restore Healthy, Plastic-Free Oceans
More Ocean. Less Plastic.

THE LARGEST CLEANUP IN HISTORY

NATURAL RESOURCES DEFENSE COUNCIL
Solutions to Plastic Pollution in our Oceans

marine debris program
OFFICE OF RESPONSE AND RESTORATION
Great Pacific Garbage Patch

Great conglomerations of tangled material float around.

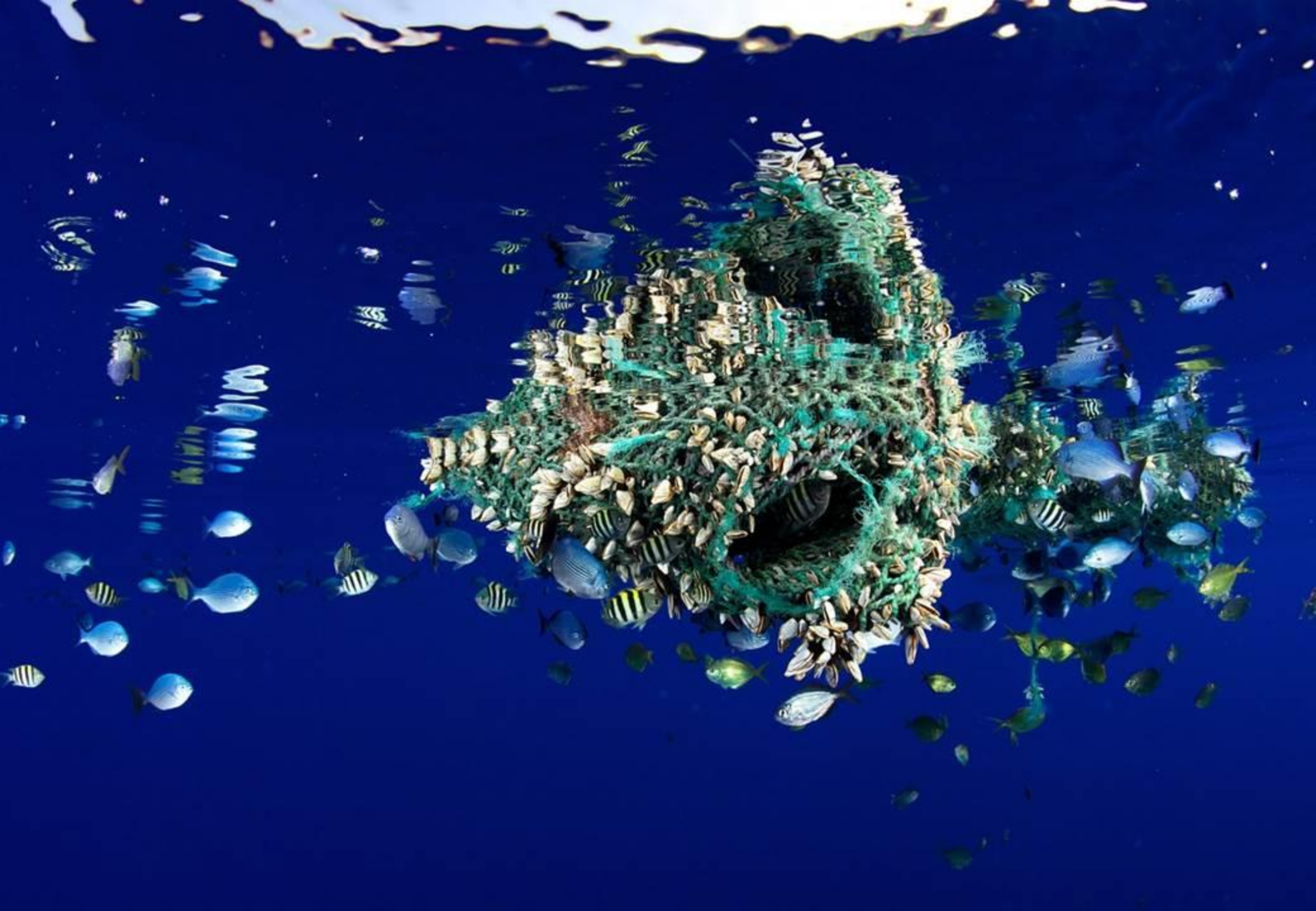


Plastic washes up on beaches all over the world.



A complex interplay of synthetic and living systems.





A problem prevalent in emerging economies.





Our ocean playgrounds are contaminated.







Some of the most remote places in the world affected.



Tsunami and storm debris adds to the total.



Plastic likely to wash back into the sea.



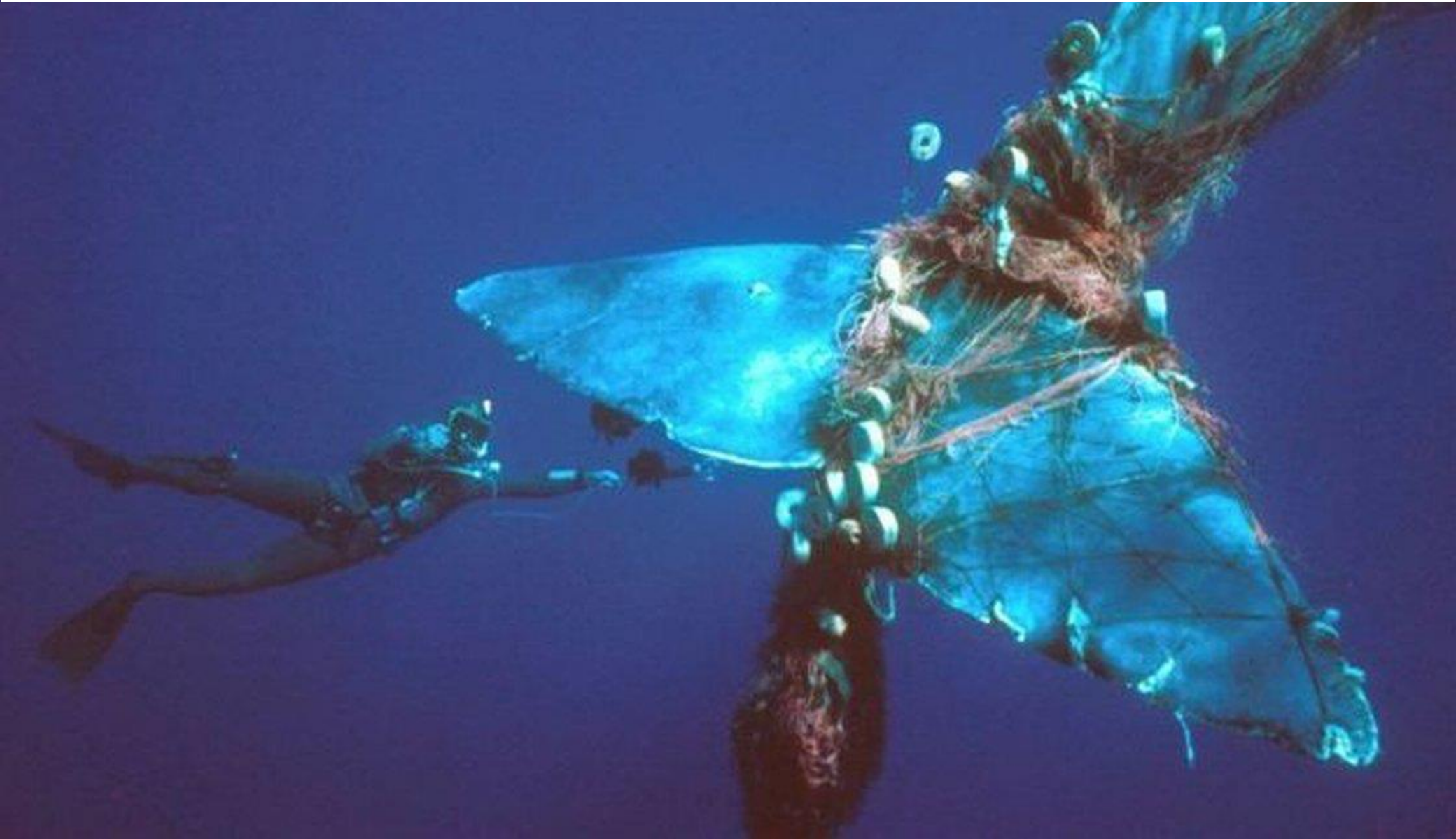
This turtle had a plastic straw removed from its nostril.

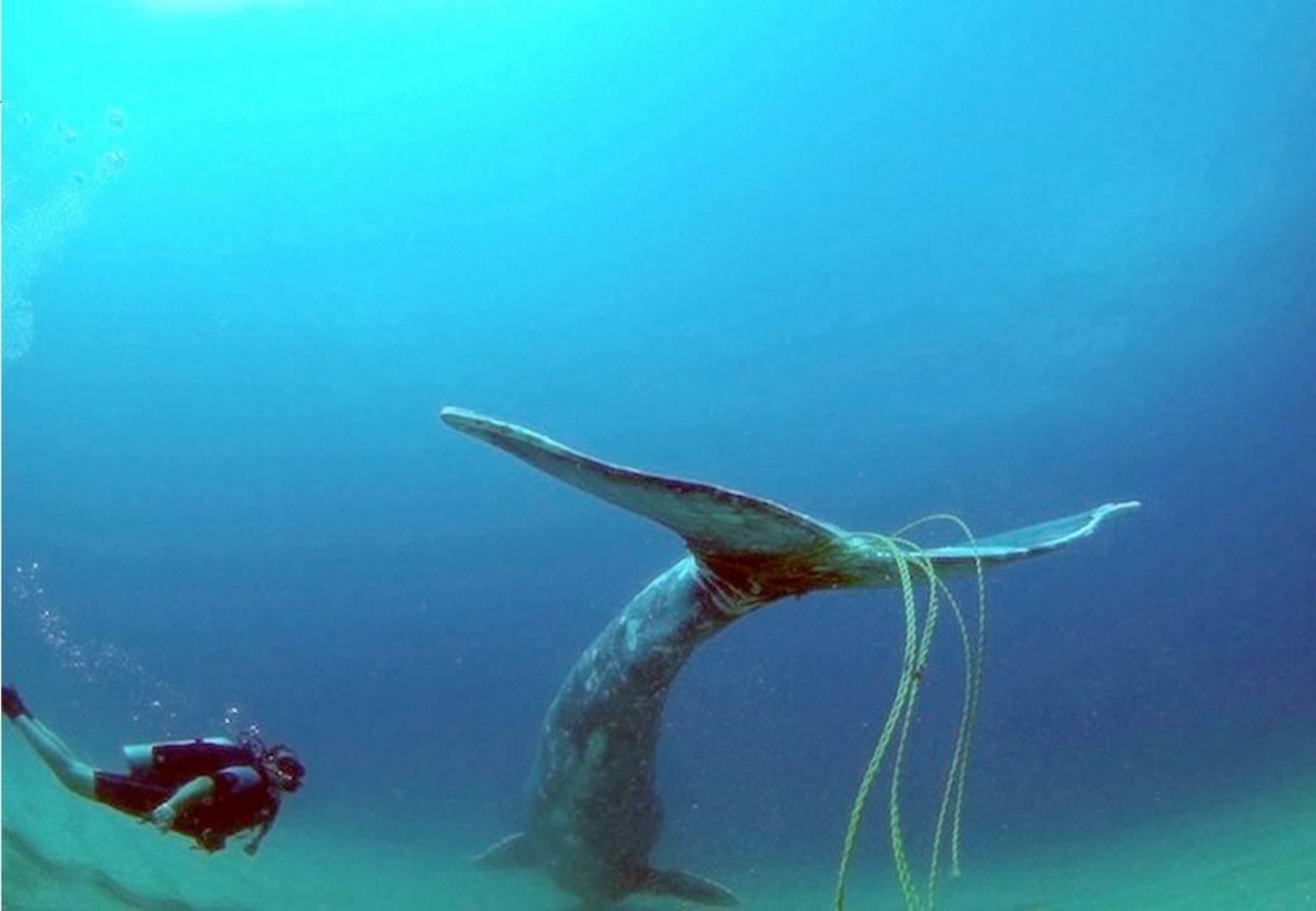


A sea lion with plastic wrapped around its neck.

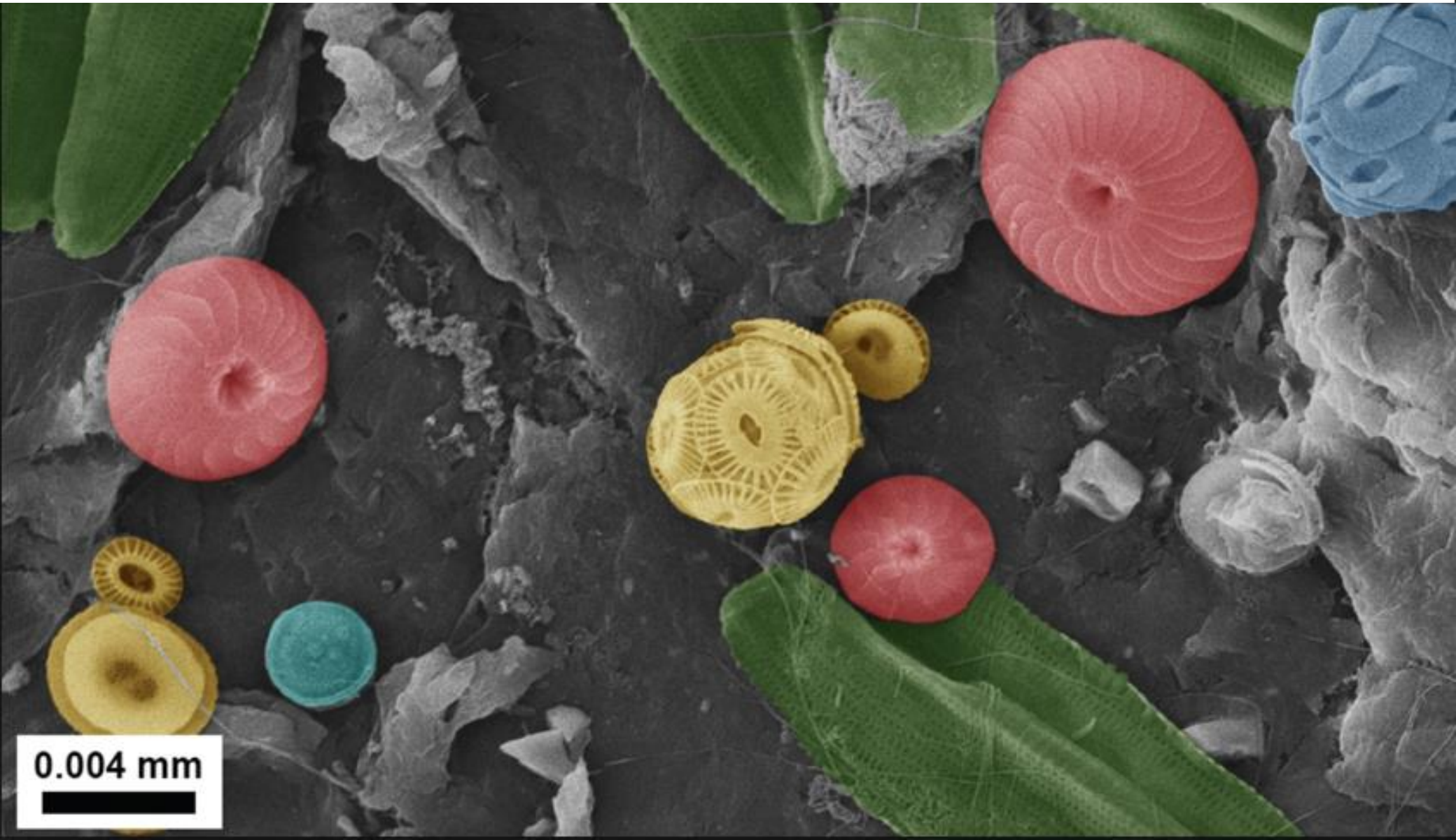


Even the whales suffer from marine plastic.





Nature fights back but evolution is extremely slow.



0.004 mm



Marine Plastics Hot Spots: Maldives.



Marine Plastics Hot Spots: West Coast of Alaska.



Marine Plastics Hot Spots: Midway Atoll.





Multiple Potential Solutions

Prevent waste
entering the sea

Replace plastic
with sustainable
biopolymers

**Retrieve & dispose
of waste from sea
and shorelines**



The Cleanership

1,800 tonne boat tuna purse seiner

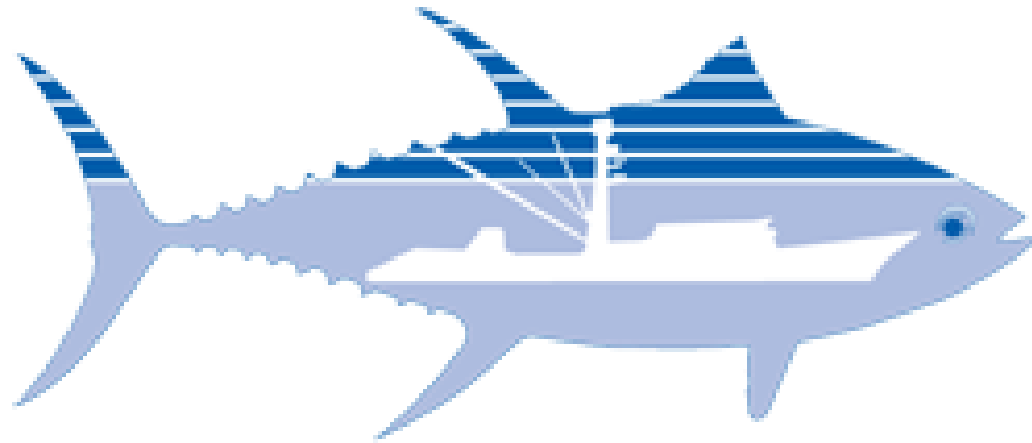






Is this a good ship?

- Many are available second-hand at a good price
- Hardy working boat with plenty of bunks
- Large deck area
- Stern ramp & cranes suited to loading plastics
- Functional crow's nest to observe operations
- Suited for long duration at sea
- Sympathetic aesthetics
- It's not just a ship, it's a class of ships



American Tunaboat Association



What to do with the plastic?

- ✓ **Store onboard and deliver to shore**
(the ship has 1,200 tonnes storage capacity)
- ✓ **Convert to energy to power ship**
(two technological pathways)
- ✓ **Thermal oxidation with carbon offset**
(high volume, low cost)

Cleanership plastic disposal technology options.

Note: the selection of disposal technology options is under research.

1

Thermal oxidation destroys plastic and produces heat.

2

Plastoil technology makes diesel fuel from plastic.

3

Organic Rankin cycle turbine uses heat to make electricity.

4

Diesel electric powertrain uses electricity to power the ship.

1

3

2

4

Not to scale.



Thermal Oxidation

High temperature
incinerator
800 – 1,000°C

Produces lots of excess
heat.





Organic Rankin Cycle Turbine

Takes waste heat and converts it to electricity





Plastic to fuel technology

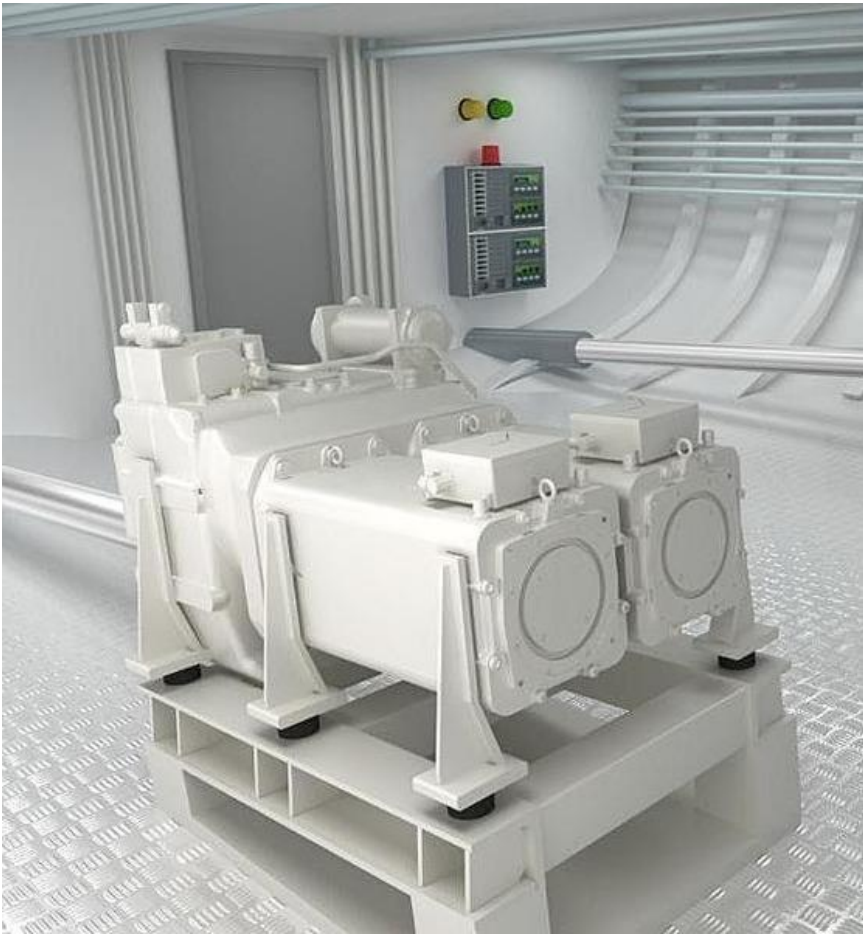
Converts plastics into diesel fuel.





Diesel electric propulsion

Burns diesel to make electricity to drive an electric motor.



How much plastic?



Thermal Oxidation = 3 x 19 = 57 tonnes per day

Plastic to diesel = 1 tonne per day

= 58 tonnes per day

x 365 days per annum

= 21,170 tonnes per annum



Desalination plant

Uses waste heat to create freshwater from the sea.





Proposed timeline

Set sail September 2017

| | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 2016 | 2016 | 2016 | 2016 | 2016 | 2016 | 2016 | 2016 | 2016 | 2016 | 2016 | 2016 | 2017 | 2017 | 2017 | 2017 | 2017 | 2017 | 2017 | 2017 | 2017 |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

1
set up &
raise
\$25 million

2
Draw
Contracts
&
engage
professionals

3
Find and
buy a ship
& steam
to yard

4
Set
sail

T
O
D
A
Y

← Refit the ship →



thermal oxidation
produces carbon
footprint



**1 ton
plastic**

=



**4 tons
CO2e**

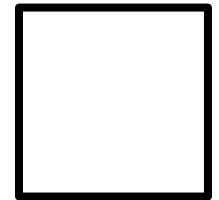
How to eliminate a big problem.



Turn it into a small problem that can be easily neutralized.



21,170 tons marine plastic



84,680
tons CO₂e
neutralized by
carbon offset







Some CO2 context

If we incinerated all 8 million tons of plastic...

$$8,000,000 \times 4 = 32\text{Mt CO}_2\text{e}$$

Equivalent to the carbon footprint of Uruguay

0.1% of global emissions

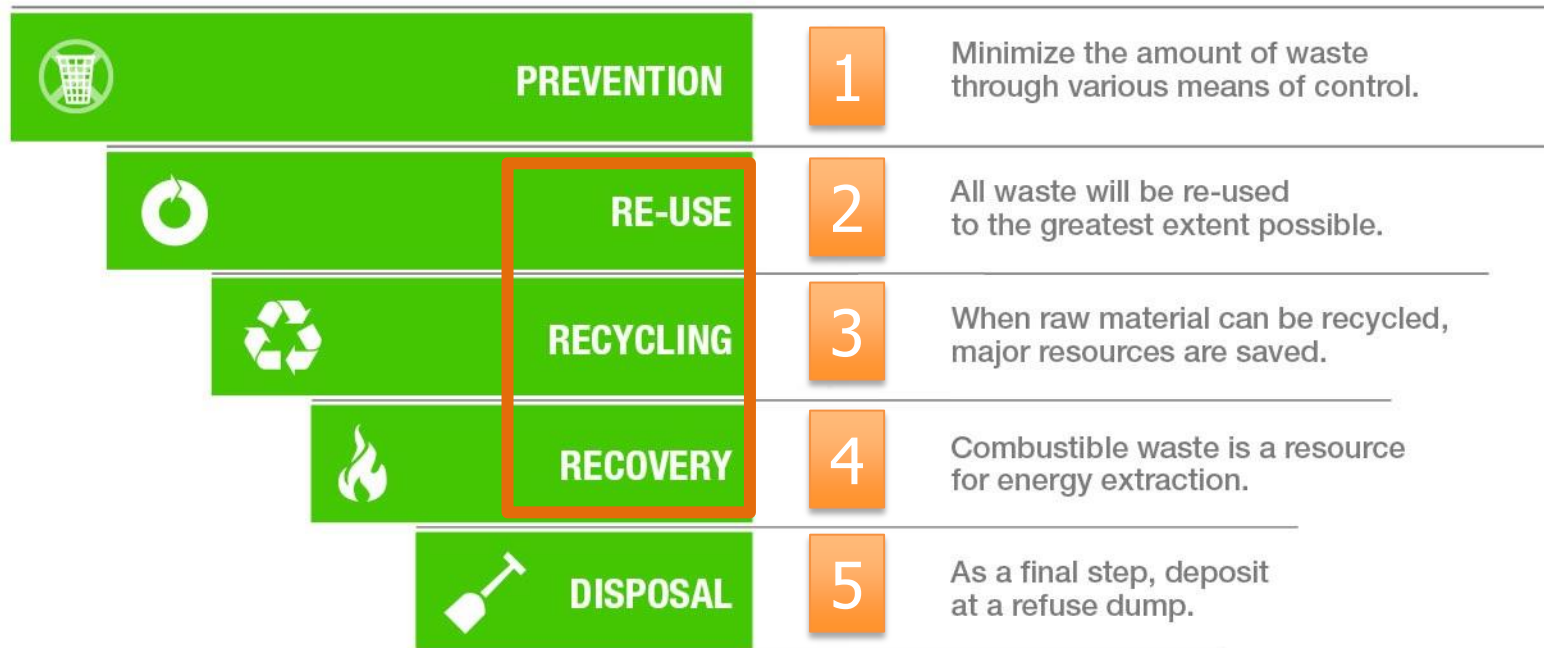
| Country | GHG emissions (MtCO ₂ e) | Percentage of global total (%) |
|--|-------------------------------------|--------------------------------|
| World | 42,669.72 | 100 % |
|  Yemen | 34.15 | 0.1 % |
|  Uruguay | 32.94 | 0.1 % |
|  Dominican Republic | 31.44 | 0.1 % |
|  Mongolia | 28.27 | 0.1 % |



Consistent with EU Waste Management Hierarchy

Cleanership provides material for reuse, recycling and energy recovery.

EU'S WASTE HIERARCHY





Cleanership Budget*

| | |
|----------------|-------------------------------|
| US\$3 million | purchase a ship |
| US\$4 million | refit and upgrade the ship |
| US\$5 million | install disposal technologies |
| US\$13 million | annual operations 3 - 5 years |
| Total | US\$25 million |

*Back of envelop calculations based on discussions with sea captain and technologist.



Crowdfunding the Cleanership



If it's possible to raise \$12.5 million in a month for a high-tech beehive, it ought to be possible to double that for a pathway to an ocean without plastic.

INDIEGOGO

chuffed





Crowdfunding Rewards

**Opportunity to Serve
on-board via Crew Pass**

Plastic Neutrality



Serving on the Cleanership

Professional Paid Crew

- Captain
- Chief Engineer
- Second Engineer
- Chef & Assistant
- IT and electrics technician

- Process Engineer
- Process Assistant

- Coordinator and shore liaison
- Social media / communications

Cleanership Champions

There's room for only 10 volunteers per 3 month voyage

Retrieve & process plastics

Maintain the Cleanership and equipment

Contribute to the social media campaign



Cleanership Champions



Why would you volunteer?



- 3 month adventure of a lifetime
- Visit exotic locations
- Serve a higher cause: saving marine ecosystems
- Enjoy unique challenges and experiences
- Unique learning experience
- Acquire logged sea-time
- Make new friends



Cleanership Volunteer Crew Lottery*



*All volunteers require a Crew Pass

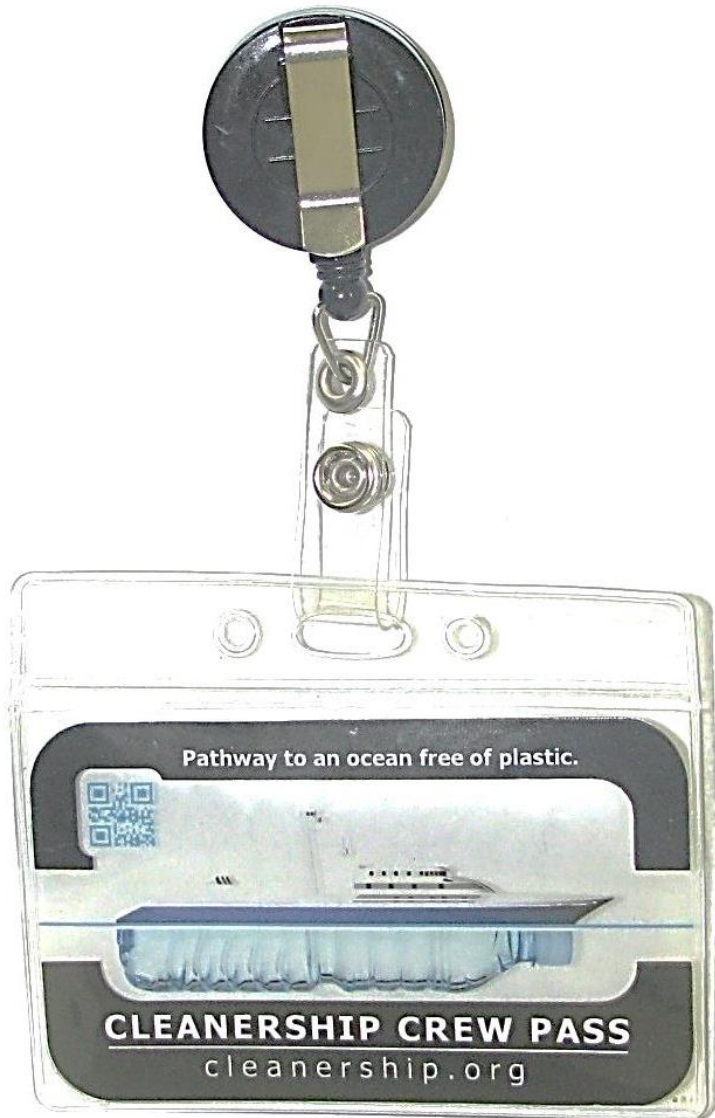
Do you have a Crew Pass?



You need more than just a Crew Pass to serve on the Cleanership.

You'll also need:

- Relevant experience
- Referees
- A Medical
- First Aid Certificate
- Passport
- Visa
- Lots of Luck





cleanership
.org



CLEANERSHIP

— CREW PASS —

a pathway to an ocean free of plastic

Made from sustainable bio-polymer





Exclusive Cleanership

With only 40 volunteer positions per annum,
Cleanership is more exclusive than
The Titanic & Willy Wonka's Chocolate Factory



Plastic Neutrality

It's like carbon offset, but for plastic.



Plastic Neutral CERTIFICATE

Congratulations **Joe Nemo**, you are now plastic neutral
for the year 2015



cleanership.org



The Cleanership Challenge



cleanershipcool



How much does it cost?



Assume 21,170 tons per annum

x 5 years = 105,850 tons

/ \$25,000,000

= \$236 per ton

Australia per capita plastic = 100kg per annum

=\$23.60 to be plastic neutral for one year

New Technology and Practices





Undersubscription Risk Management

This is what we can do with the funds:

\$250,000 raise money the slow way

\$1.5 million full feasibility study and raise money

\$6 million buy and refit the boat and put to sea

\$10 million buy & refit the boat and operate for 1 year

\$14 million buy & refit the boat and operate for 2 years

\$18 million buy & refit the boat and operate for 3 years

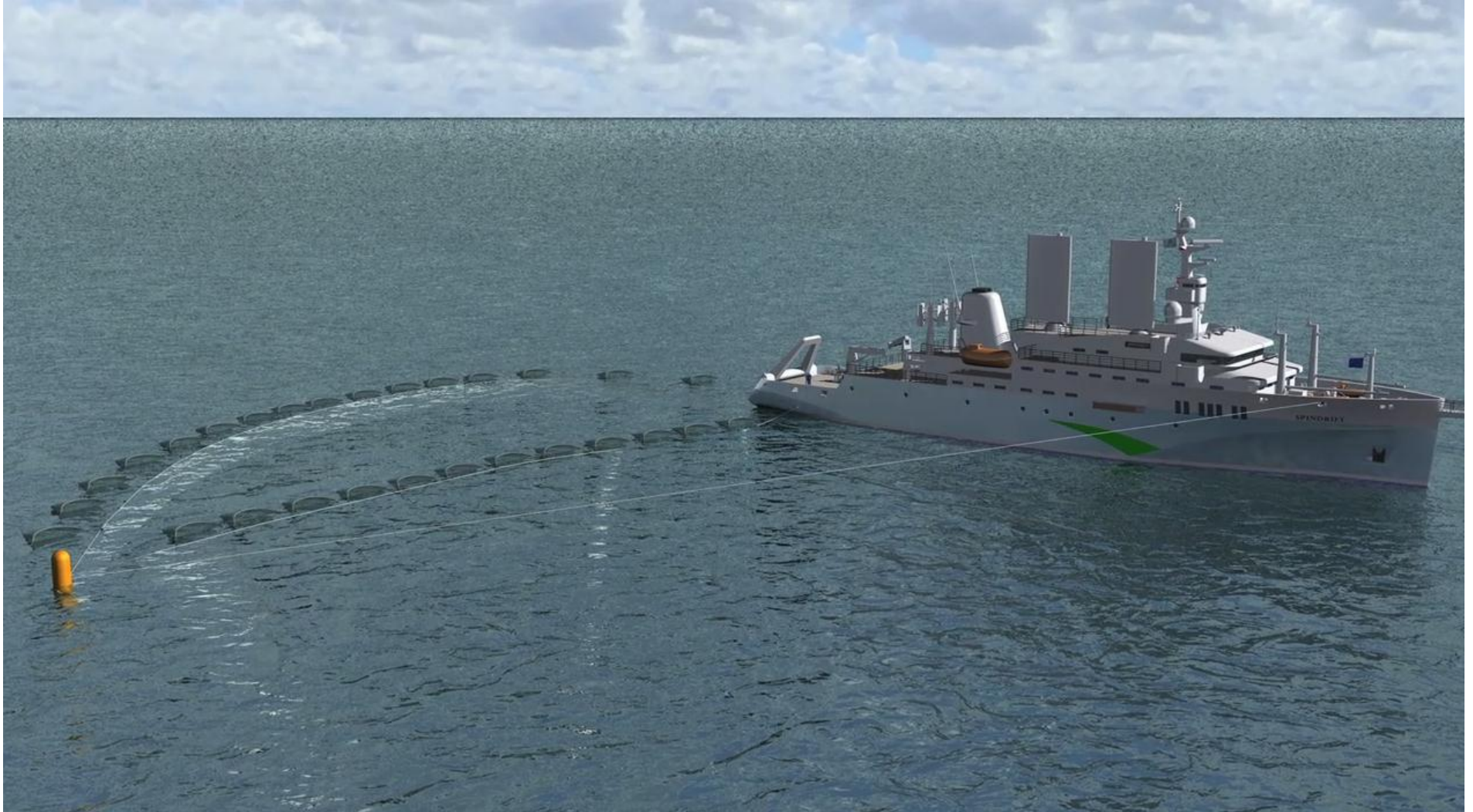
\$22 million buy & refit the boat and operate for 4 years

\$26 million buy & refit the boat and operate for 5 years



The Competition

DNV/WWF Spindrift (2012 – 2014)



The Ocean Cleanup





Volunteers with results of one cleanup of Cape Arnhem after it has been taken to the local dump near Nhulunbuy.
Photo Sam Muller.

Waste Management

Our objective has always been to have an ocean free from ghost nets, but in the meantime we are left with the very real issue of what to do with the tonnes of net that wash ashore.

The disposal of rubbish in remote areas in Australia is extremely challenging, so the safe and environmentally sound disposal of tonnes of plastic net material is virtually impossible. In most instances ghost nets are bunt in situ or taken to local landfill where they are eventually buried. Environmentally neither is a good option, so we've been working hard to investigate others.

Given the nets are primarily plastic, we have explored many plastic recycling options including:

- supplying the nets as feedstock for the boilers in concrete factories,
- turning nets into carpets,
- creating composite plastic products (such as fence posts), and
- even returning the plastic into a type of diesel fuel.



Cleanership is Blue Ocean
- no competition -

A vision of an ocean free of plastic.

