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Since the development of agriculture,
human population has increased by 1000x going from
~7 million to **7.8 billion** today.

350 Million Tons

2.8% of body weight / day

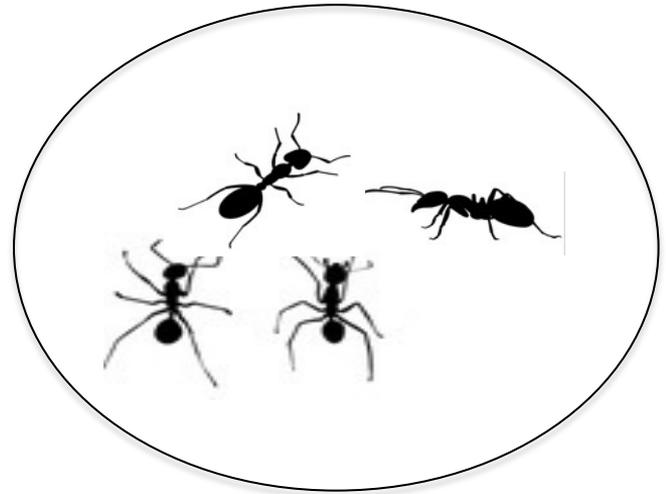


10 Million

Tons of food / day

~350 Million Tons

30% of body weight / day



>100 Million

Tons of food / day

Ants consume 10x more food, and enrich the world.



the golden rule for all species:
Ecosystem Services > Ecosystem Consumption



Iberá National Park – Restoration initiative launched by Kris and Douglas Tompkins

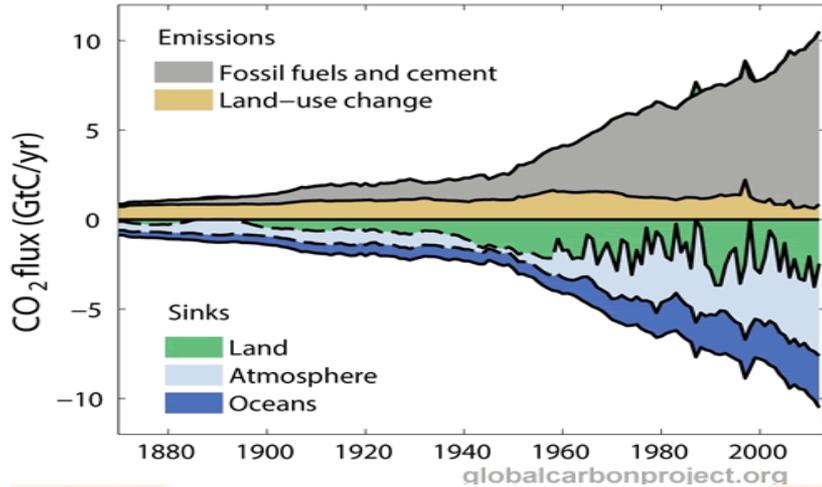


Our goal: create a **net-positive civilization** where:
Ecosystem Services > Ecosystem Consumption

In other words:
How can humanity be a net positive to nature?

So where are we starting from?

The Global Carbon Budget 1870-2012

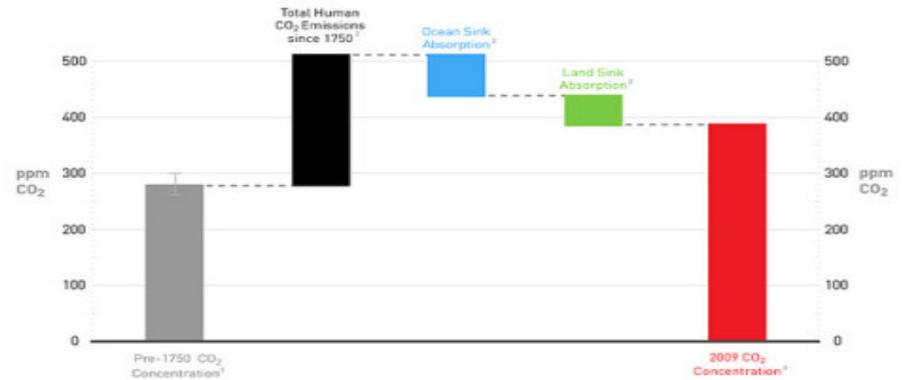


Why carbon sinks matter

If it weren't for the oceans, soils and plants CO₂ concentrations would be over 500ppm

References

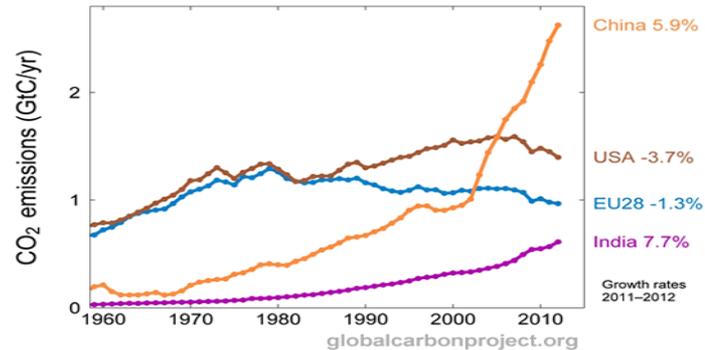
- IPCC, 2007a, WGII, p. 100
- IPCC, 2007a, WGII, p. 5.7.5 (supplemented with ORNL)
- IPCC, 2007b, WGII, DWR1, p. 142



WORLD GHG EMISSIONS FLOW CHART 2010



The Four Largest Emitting Regions

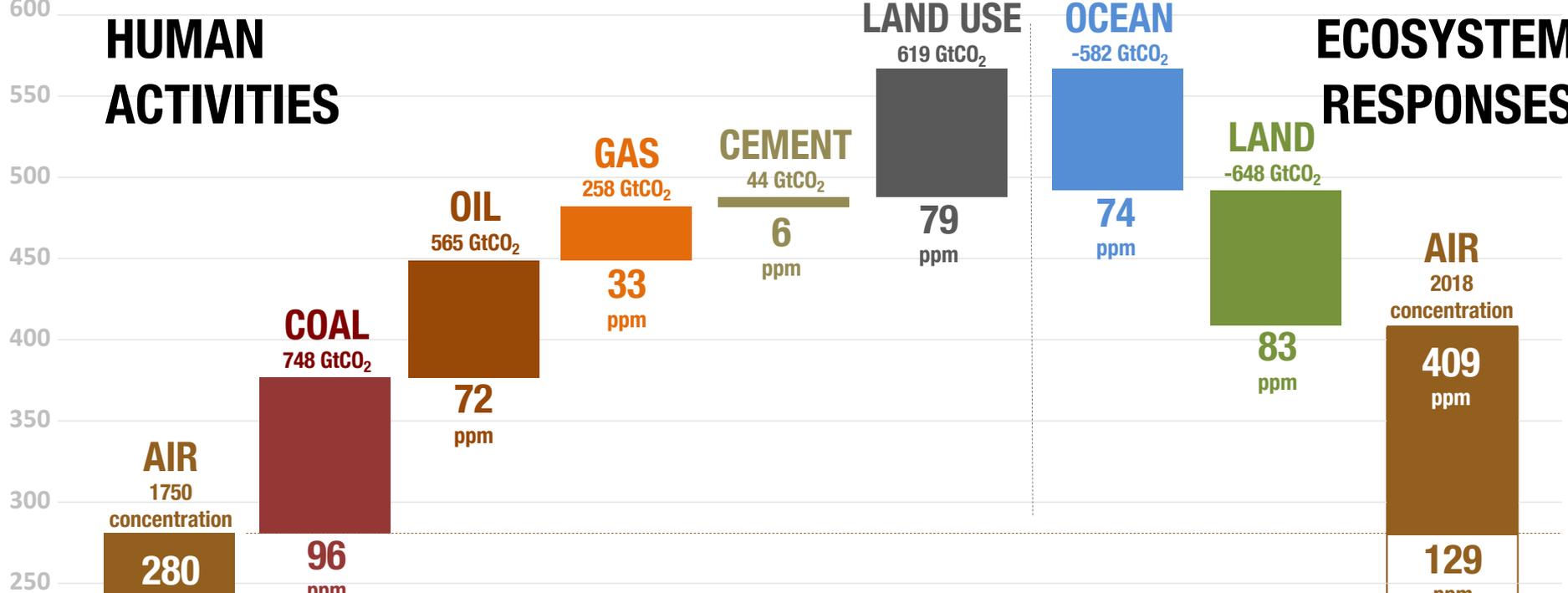


HUMAN ACTIVITIES

LAND USE

OCEAN

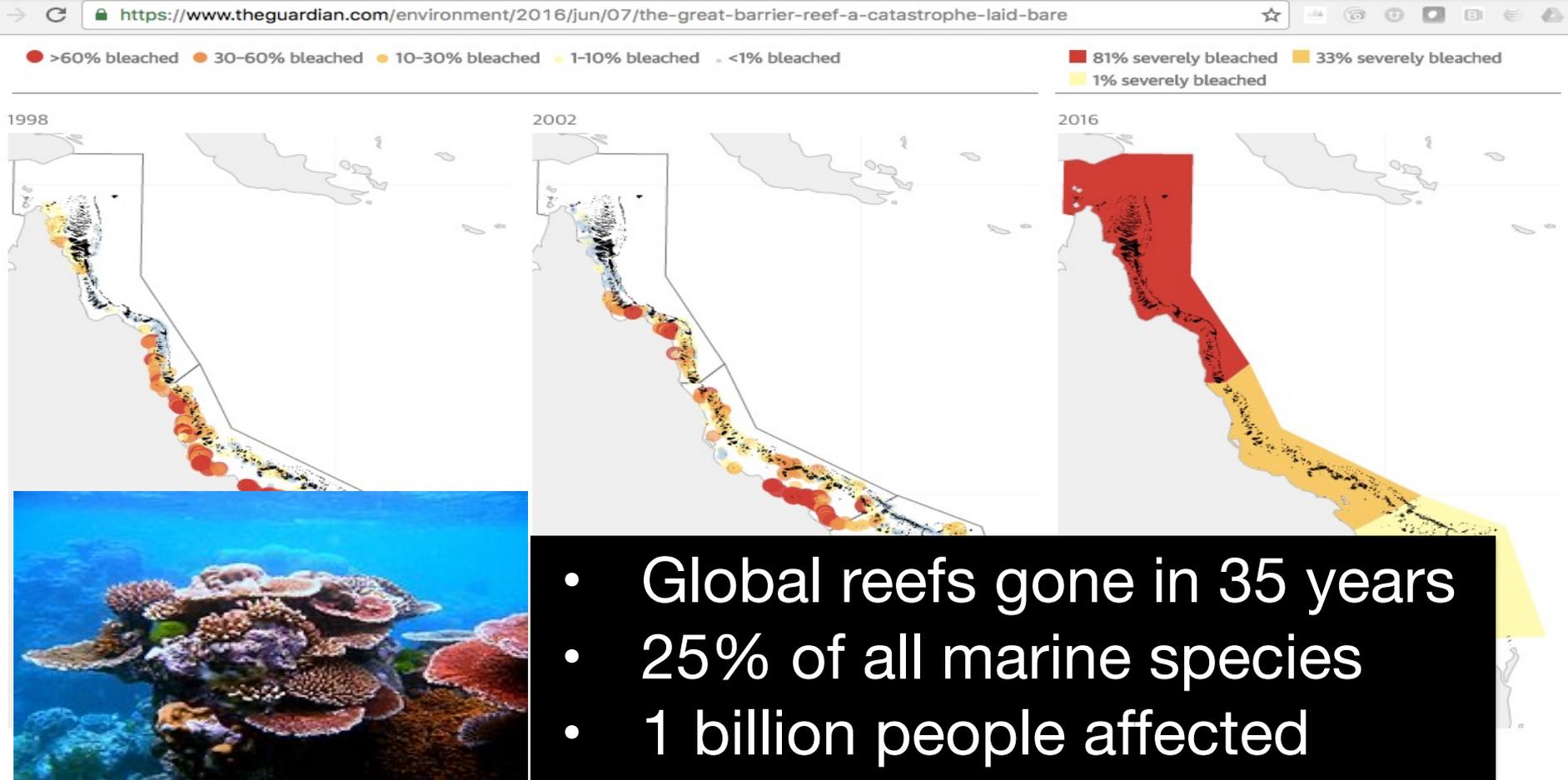
ECOSYSTEM RESPONSES



HUMAN IMPACT SUMMARY:

- 2234 Gt CO₂ added since 1750
- 582 Gt → Ocean (-0.11 pH = 30% more acidic)
- 648 Gt → Land (Plants, Soil, Detritus)
- 1004 Gt → Air (Climate Destabilization)

Some of these impacts are catching up with us fast...



Ocean Challenges

Macro-scale:

- Thermal Stress
- Upwelling Suppression
- Acidification

Fishing Practice:

- Regulatory Violations
- Overfishing
- Bycatch
- Trawling

Pollution

- Effluent (Human, Factory Farming, Aquaculture)
- Fertilizer, pesticides, eutrophication
- Solid wastes – plastics, heavy metals
- Oil spills and industrial errors
- Noise Pollution

Habitat Destruction

- Wetlands, Mangroves, Seagrasses
- Coral Reefs (dynamite, cyanide)
- Seafloor (via Trawling)
- Coastal Erosion

The damage is large and the time is short, so...

How will net positive be possible?

Change Accelerator: Invention Catalyst



New capabilities shape our belief of what's possible,
and can drive rapid transformation.

Ocean Energy

Pilot device manufacturing

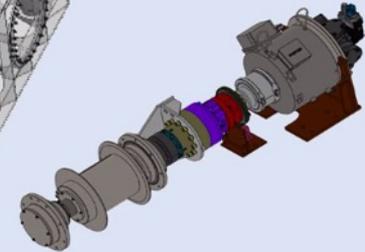
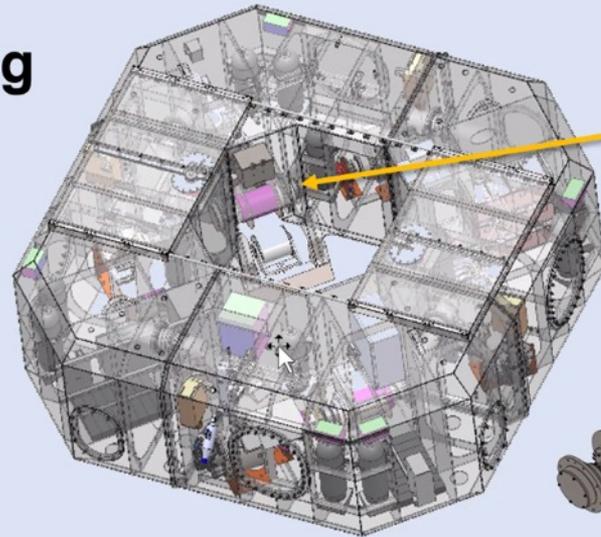
Status as of Sep 21

Location: Scripps Pier, San Diego.

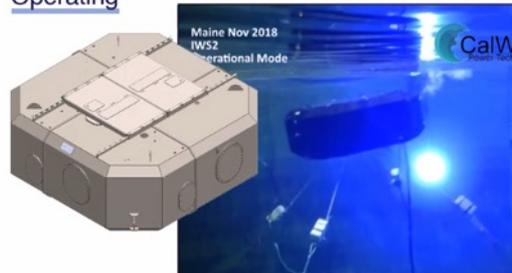
Status: Permits received; construction started.

Testing: Q3 2021 - 6-8 month.

Funding: Funded by U.S. DOE and seed investments

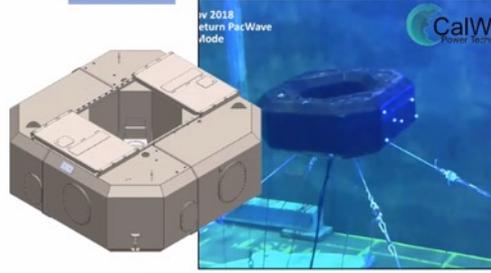


Operating

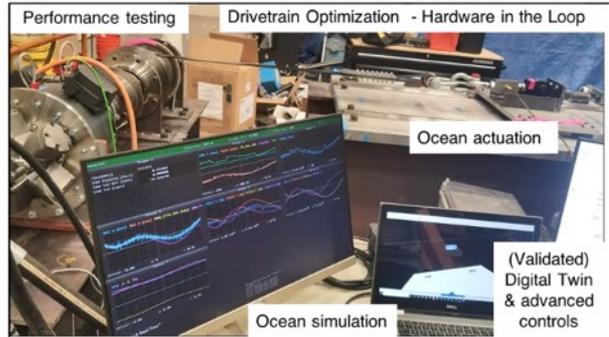


2018 & 2021 Wave Tank performance validation

Shutdown

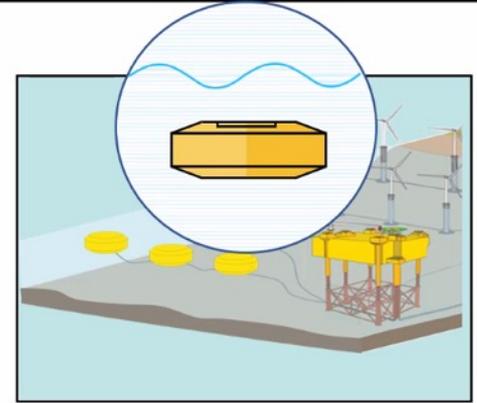
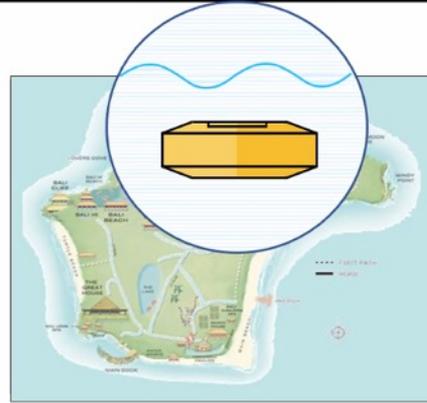
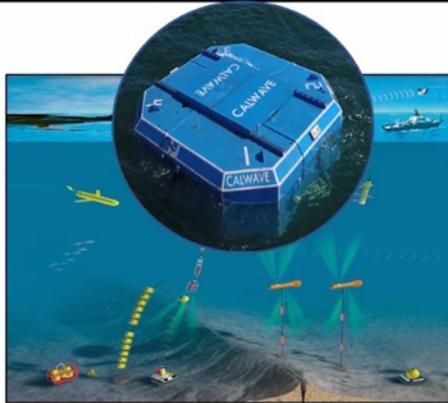


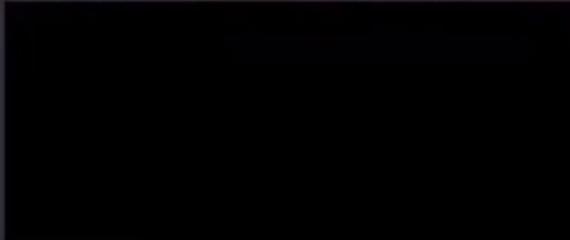
2018 & 2021 Wave Tank 50 year storm wave shut down validation



CalWave's submerged Product Lines

Name	xNode	x100	x800
Power [kW]	1-5 (continuous)	100	800
Size [m]	4	11	20
Application	Offshore IOT	Island micro grids	Utility scale farms
Differentiation	Light weight, versatile, onboard data center	Submerged, storm resilient, 24/7 power, 10-30 cent/kWh	Submerged, storm resilient, 24/7 power, 5-10 cent/kWh
Business model	Power and data as a service	Sale and after sales contracts	Sale and after sales contracts
Payback period	0.25-0.5y	6y (at 30 cent)	7y (at 5 cent)
Market entry	2022	2024	2026





CDIP Monitoring and Prediction of Waves and Shoreline Change
coastal data information program

Station 201 -
9-band Direction
9-band Height
9-band Plot
Climatology
Compendium
Displacement
Feather
Ho Box Plot
Landing Conditions
Max Wave History
Mountain
Parameter Table
Period Rose
Polar Spectrum
Sea & Swell
Characteristics Data

Observed Data 01 minutes ago
Significant wave height: 1.85 m / 6.07 ft
Peak Period: 6.88 s
Direction: 277°
Temperature: 19.8 °C / 67.3 °F
Oct 12, 01:56 UTC

Station Details
Latitude: 32.86000 N
Longitude: -117.26660 E
Depth: 48 m / 157 ft
Previous Deployments
NDBC (WMO Identifier): 40254

Date: Oct 12, 01:00 UTC
Observed: 1.77 m / 5.81 ft
NOAA/WWS: 2.18 m / 7.14 ft

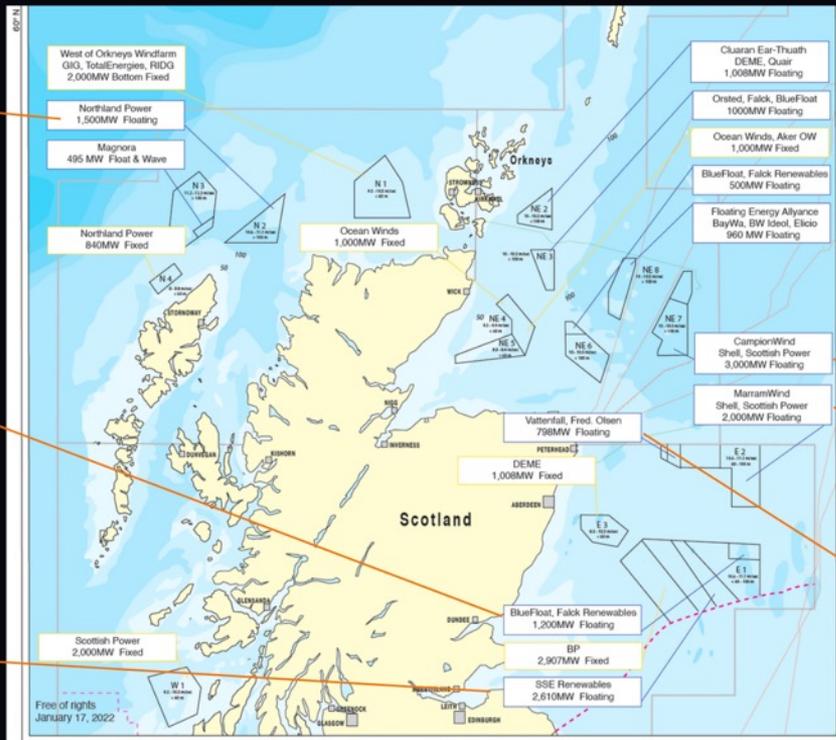
waveHs
Graph showing wave height (Hs in m) vs Date (UTC) from Oct 06 to Oct 18. A significant peak is visible on Oct 12.

Scrpps Nearshore, CA Conditions + Forecast
Graph showing wave height vs Date (UTC) from Oct 06 to Oct 18. A significant peak is visible on Oct 12.

SCRIPPS NEARSHORE, CA - 201

ScotWind Lease Round in Q1 '22 Signals Market Maturity

Scotland: 15GW Floating Wind by 2030



1.5GW



1.2GW



2.6GW



1.0GW

1.0GW



1.0GW

3.0GW



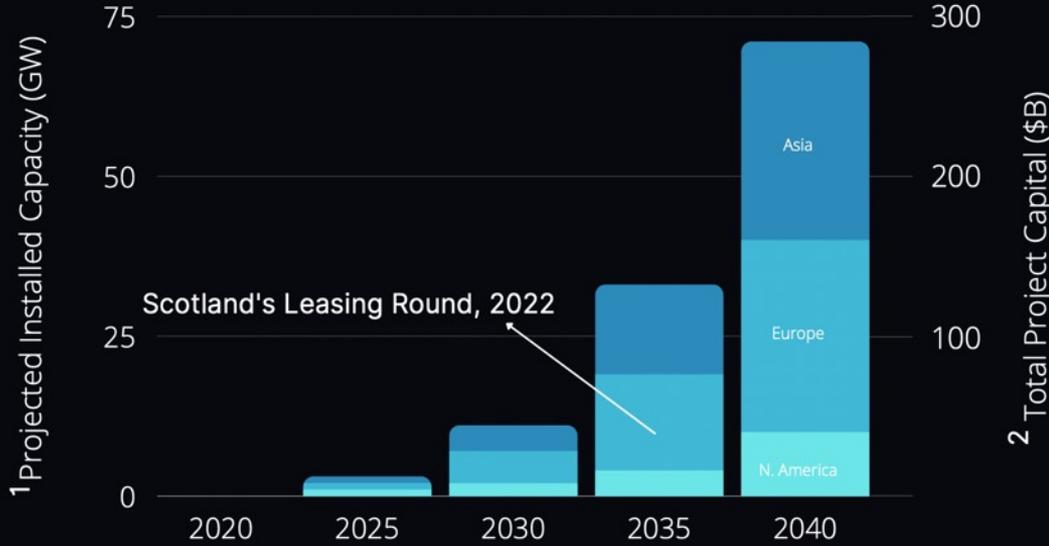
2.0GW



2.0GW

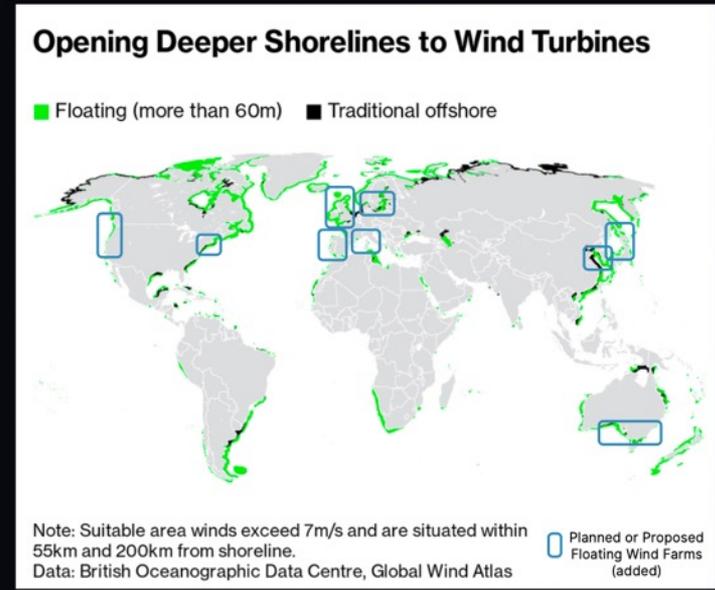


Floating Wind Market + Projections



¹ Carbon Trust Floating Wind JIP Phase II Summary Report, 2019

² BVG Associates Guide to an Offshore Wind Farm



"Floating Wind Could Supply the World's Electricity"
-Bloomberg News 06/05/2020

The OPEX Problem: Logistics

Draft, air draft and beam **restrictions**, developed from the shipping container industry, prevent the utilization of most industrialized ports



The Industry has Steel in the Water

25MW WindFloat Atlantic Project, Northern Portugal

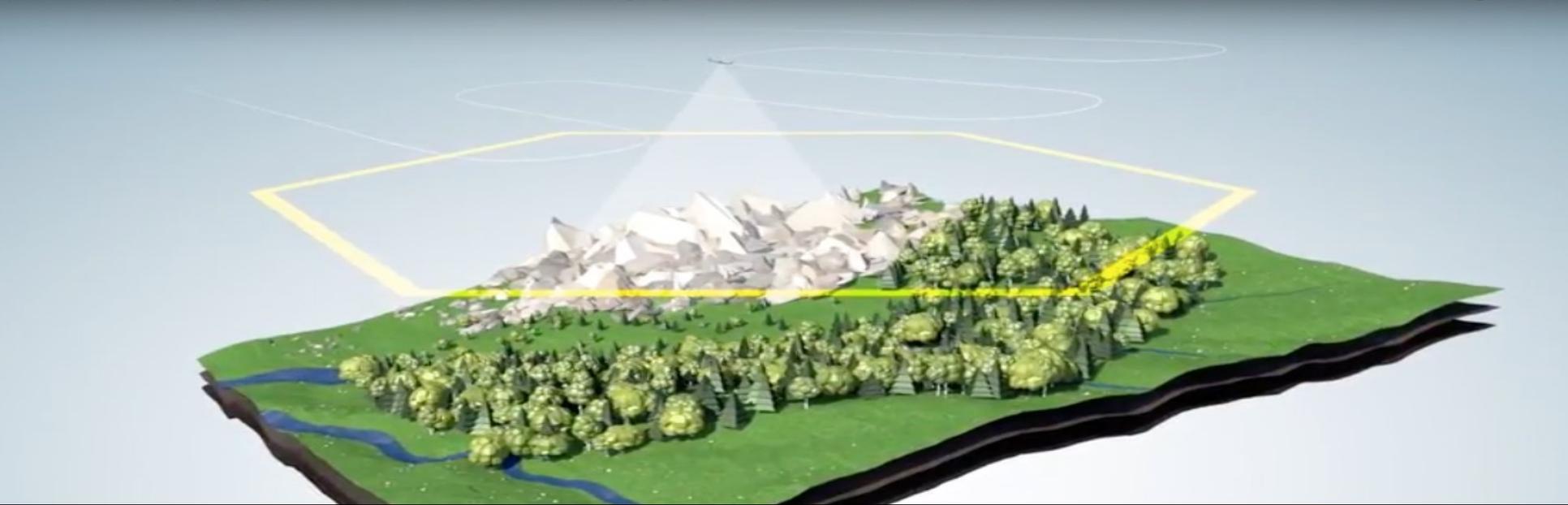
First Semi-Submersible Floating Wind Farm
COD 2020

3 x 8.3MW Vestas V174 Turbines

Principle Power's WindFloat Platform



Ecosystem Restoration



Catalyst: Plant 20 billion trees / year

<https://goo.gl/pWqrWV>



UAV Planting Mechanism



Biodegradable Seed Pods



Field Trials



Weights 2-20 tons | ~48% Carbon by Mass





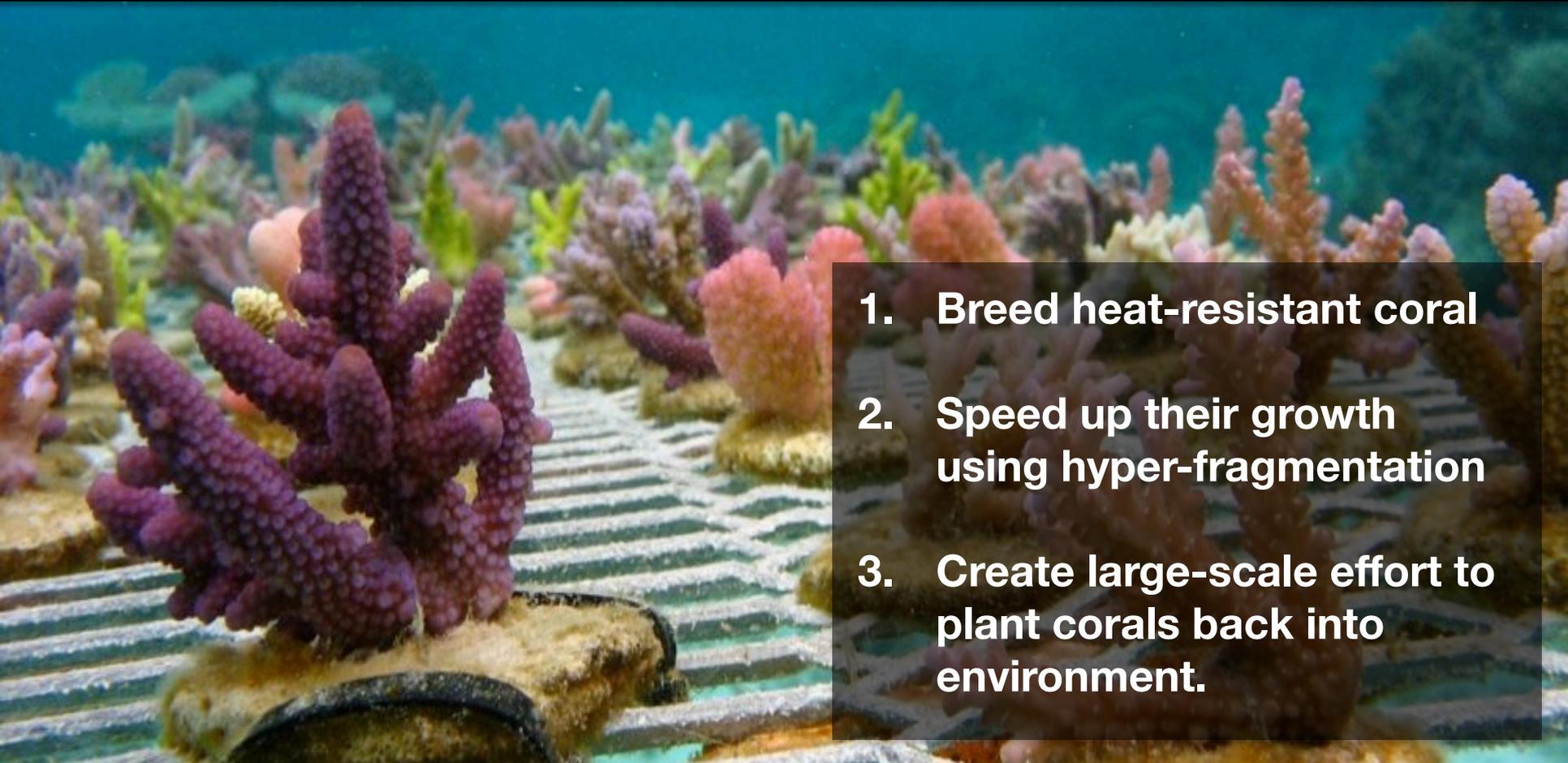
20 billion trees / year:

- 9000 drones
- 450 staff

Total: \$80M / year

Catalyst: Active Coral Restoration

<https://goo.gl/LWdQYQ>

- 
1. Breed heat-resistant coral
 2. Speed up their growth using hyper-fragmentation
 3. Create large-scale effort to plant corals back into environment.

ARMED
MANUAL

100%

0%

0%

0%

STOPPED

ON
00:22:30

8



DEPTH
-1.5m

ALTITUDE
0.0m

WATER TEMP
26.7°C

INTERNAL PRESSURE
108.1 kPa

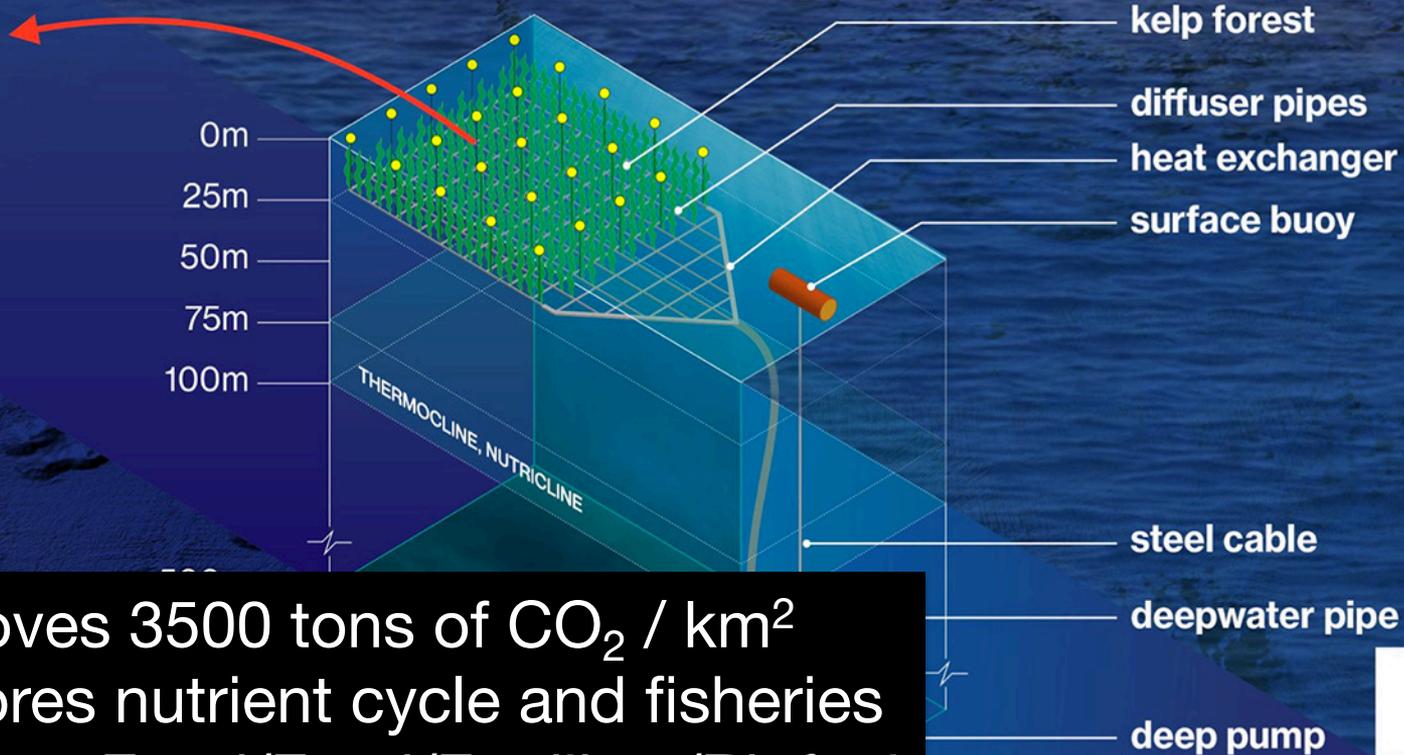
TURNOVER
0

POWER
12.0V 48.5A

RUNTIME
00:31:49

Catalyst: Marine Permaculture

<https://goo.gl/K34pkb>



- Removes 3500 tons of CO₂ / km²
- Restores nutrient cycle and fisheries
- Creates: Food/Feed/Fertilizer/Biofuel



**Change Accelerator: Awakening Global
Consciousness**

“We have the world we have because we think the way we do.”



New perspectives *can* lead to new outcomes, but make sure it works!



Kingo Energy – Central America



Thank you.

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