



# Clearing Up The Ocean's Plastic

SCAF Workshop "Practical Examples of Cost Estimating"  
Tuesday 30<sup>th</sup> April 2019

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# Who Are We?

Commercial & Supply Chain Directorate > Estimating Department.

The Estimating Department has 15 personnel and covers Land Systems, Aircraft Inputs, Operations and Engineering.

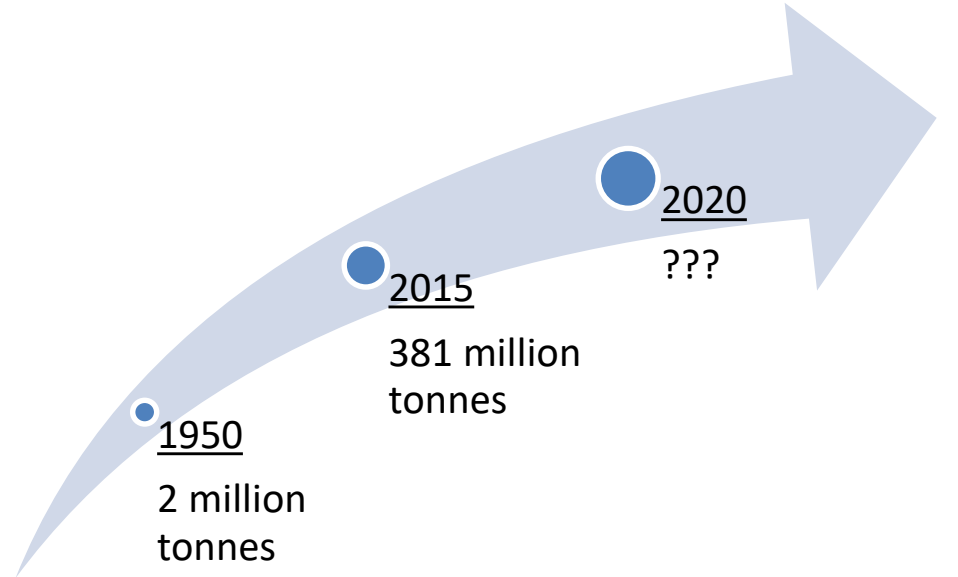
- Henry Bowden EngTech Project Estimator
- Patrick Walsh Production Estimator
- Rebecca Eden MEng CEng Engineering Estimator

**1 year of estimating experience.**



# Agenda

1. Our approach
2. Data Normalising
3. Extrapolation & Maturity
4. Current Technology
5. Prevention THEN Clean-up
6. SEER Model; UK > World
7. Conclusion



## Global Plastic Production

# Our Approach

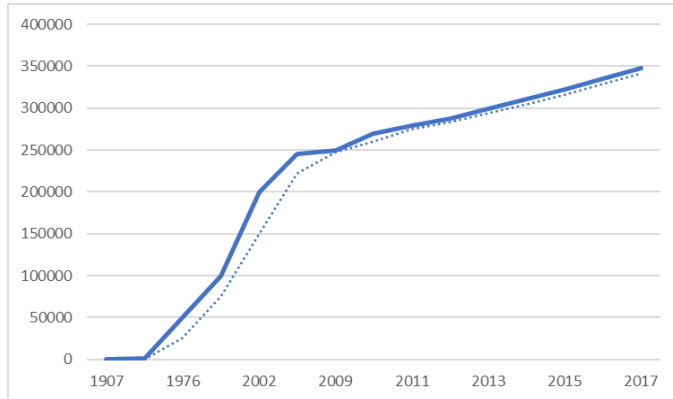


**“...gather cost and size data and then generate the cost of cleaning up the plastic...”**

# Plastic - The Silent Killer

## Global Plastic Production

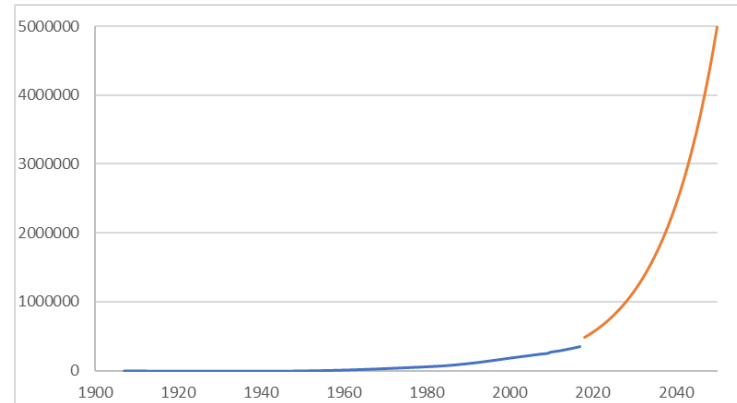
1907	Bakelite Produced
1950	1,500,000,000 kg
1989	100,000,000,000 kg
2002	200,000,000,000 kg
2017	348,000,000,000 kg



## Future Plastic Production

Assuming, global plastic production continues as is;

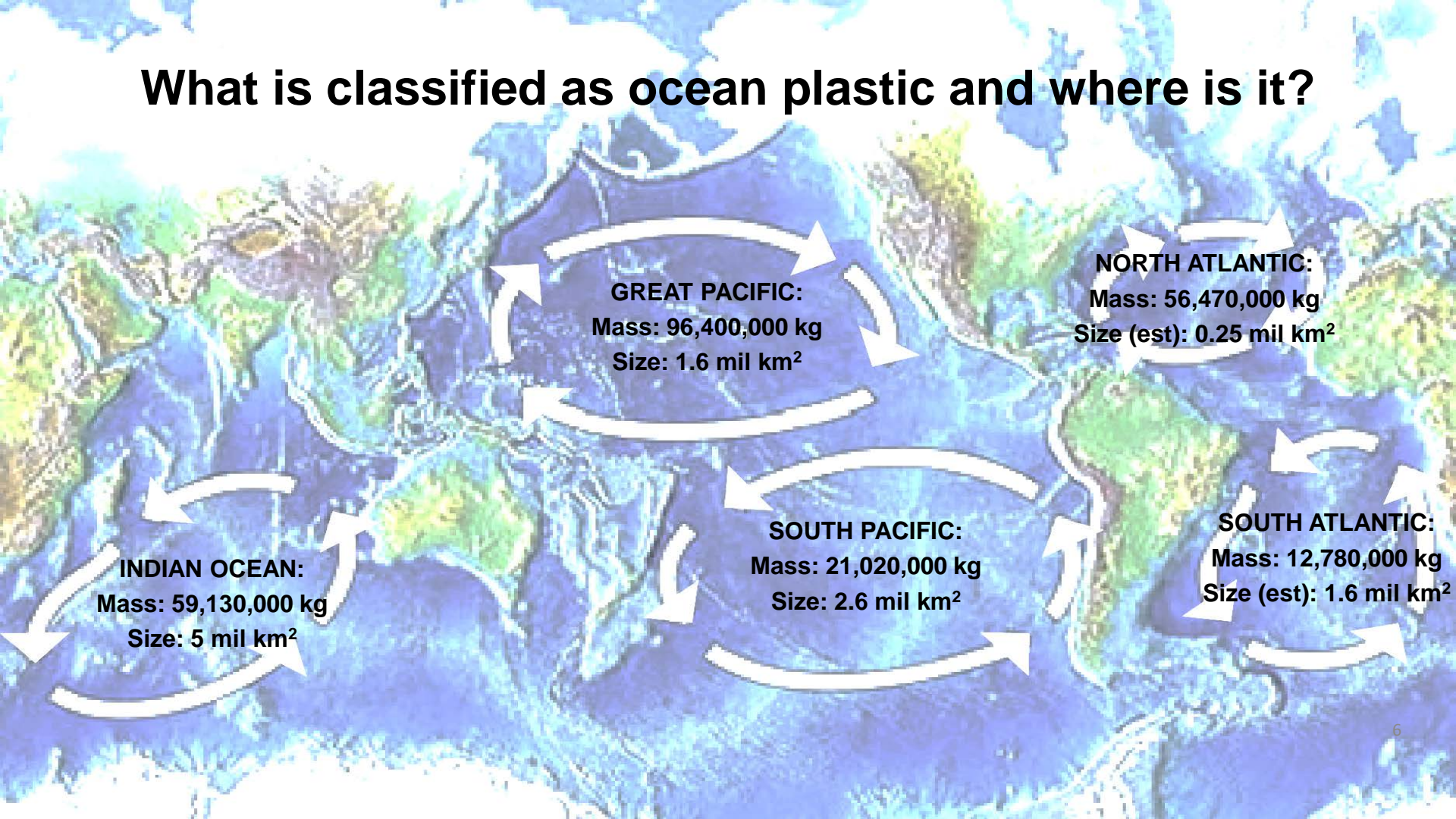
Year	Plastic Produced	Estimated Ocean Plastic
2020	554,752,000,000 kg	9,265,000,000 kg
2035	1,665,369,000,000 kg	27,814,000,000 kg
2050	4,999,444,000,000 kg	83,498,000,000 kg



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# What is classified as ocean plastic and where is it?



# Current Technology



## 2018 Data

Global Plastic Produced (Est)	479,120 million kg
Ocean Plastic Undersea (Est)	8,000 million kg
Ocean Plastic Surface (Est)	269 million kg

## Existing Technology

System 1 **\$20 mil per system**

- 600m long, with 3m skirt below
- Passive system.

## Cost and Time of Ocean Clear-Up

System 1 Current Performance – 680 kgs per week  
Forecast Performance – 998 kgs per week

With 10,000 systems: **Manufacture Cost \$200 billion**

	Ocean Pol (million kg)	Time (years)
2019	9,169	25
2020	9,846	27
2021	10,574	29
2035	29,018	81
2050	86,575	243

**1. Prevention**

**2. Ocean Clean-Up**





# UK Plastic Pollution

Length of UK Coastline = 11,073 miles with 610x outlets

**18.15 miles between outlets**

**Area**

**Min = 17 km<sup>2</sup>**  
**ML = 130 km<sup>2</sup>**  
**Max = 740 km<sup>2</sup>**

**90% = 520 km<sup>2</sup>**

**Mass (Per Year)**

**Min = 10,000 kg**  
**ML = 300,000 kg**  
**Max = 1,215,00 kg**

**90% = 876,000 kg**

**Mass (Per Day)**

**2,400kg per day per outlet.**

**What goes in ocean?**  
**70% - 1,680 kg**

# SEER-H – UK Waste Shark

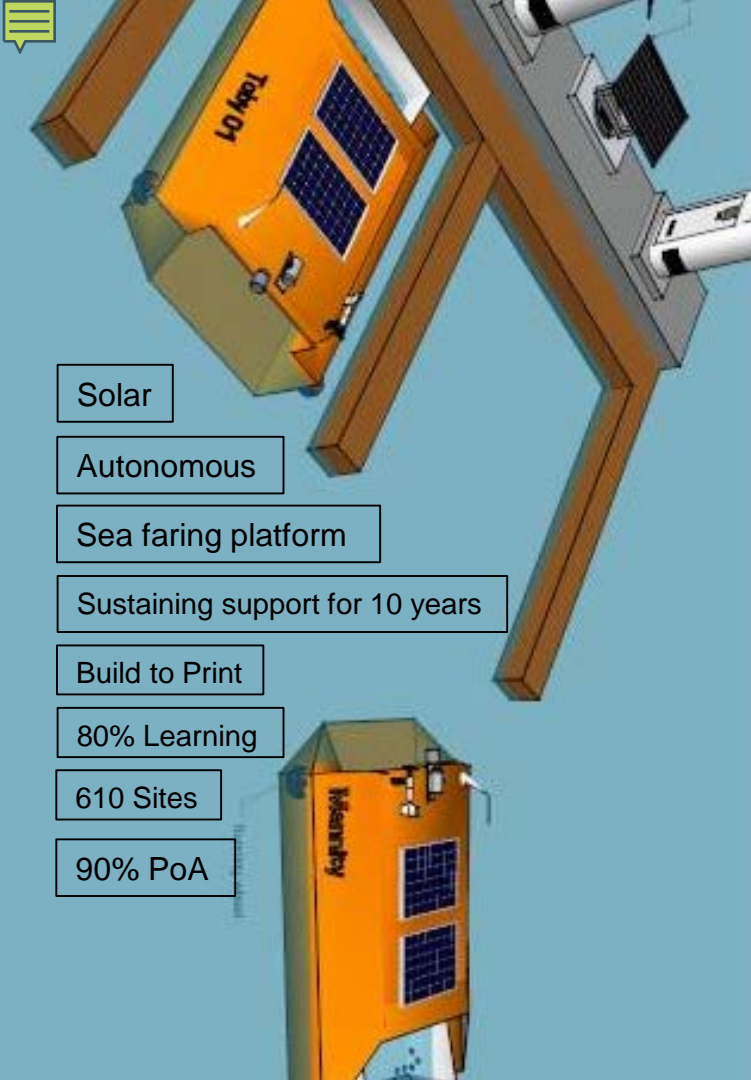


- 6x Waste Sharks per UK outlet (average).
- 350kg collection per day, per waste shark.

	Required	Modelled
Waste Sharks	3,660	5,016
Plastic Cleared kg (per day, per outlet)	1,680	2,100
Plastic Cleared kg (per year, per outlet)	613,000	766,500
UK Total kg	373,930,000	467,565,000

**TOTAL COST = £124,598,000**

Production Cost	£83,872,000 (nearest £1k)
Production Units	5,016
Total APUC	£17,875
Equipment Support Cost	£34,893,000 (nearest £1k)
System Level Cost	£5,833,000 (nearest £1k)



Solar

Autonomous

Sea faring platform

Sustaining support for 10 years

Build to Print

80% Learning

610 Sites

90% PoA

# Global Waste Shark

## World Coastal Length

World Factbook	1,162,306 km
World Resources Institute	1,634,701 km

Used 1,398,504 km = 868,990 miles

## World Outlets

Assuming miles between outlets = 18.15 (UK Est)

World Outlets= 47,880.



## Waste Sharks

Assuming 6x Waste Sharks per outlet (UK Est).

Waste Sharks = 287,280.

Production Cost	£4.8 billion
Equipment Support Cost	£2 billion
System Level Cost	£331.8 million

**TOTAL COST = £7.13 billion**

# Clean-Up

Additional 5,000 Waste Sharks required. 1,000 per Garbage Patch.

Using figures from UK SEER model.

Production Cost	£ 83,872,000
Equipment Support Cost	£ 34,893,000
<u>System Level Cost</u>	<u>£5,833,000</u>
<b>TOTAL COST</b>	<b>£124,598,000</b>

## How Long to Clear-Up Surface Plastic?

Indian Ocean - 169 days  
Great Pacific - 276 days  
South Pacific - 60 days  
North Atlantic - 161 days  
South Atlantic - 37 days

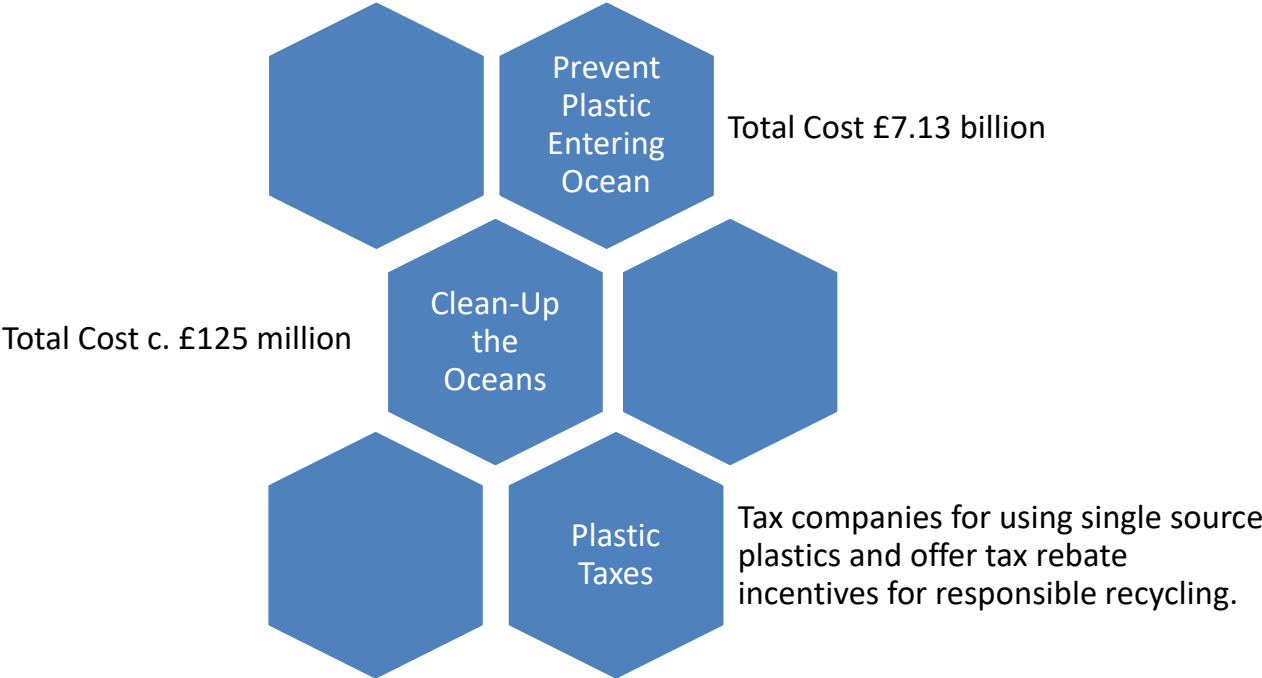
1x Waste Shark  
350 kg  
  
1,000x  
350,000 kg

Does not  
include cost  
of ocean  
retrieval.

Does not  
include cost of  
sustainable  
disposal.



# Conclusion



# Questions?

Sep 1990

