



# REMOVAL OF PLASTIC

Cost of cleaning up the Oceans

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# THE CHALLENGE

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- **Purpose**
    - Estimating the cost of removing plastic to clean up the Oceans
  - **By gathering the following data**
    - Cost
    - Quantity
    - Size
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# DEFINING THE BOUNDARIES

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- Be clear on the purpose of the model – e.g. is it to determine where UK should invest effort/finances for maximum impact?
  - Ascertain the size of the problem – think about the context e.g. can you easily access plastic or do we need to separate it from other waste?
  - Define the bounds and what your assumptions are – where in the lifecycle are you tackling? Plastic in ocean could be recycle/disposal phase.
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# AN EXAMPLE PROCESS

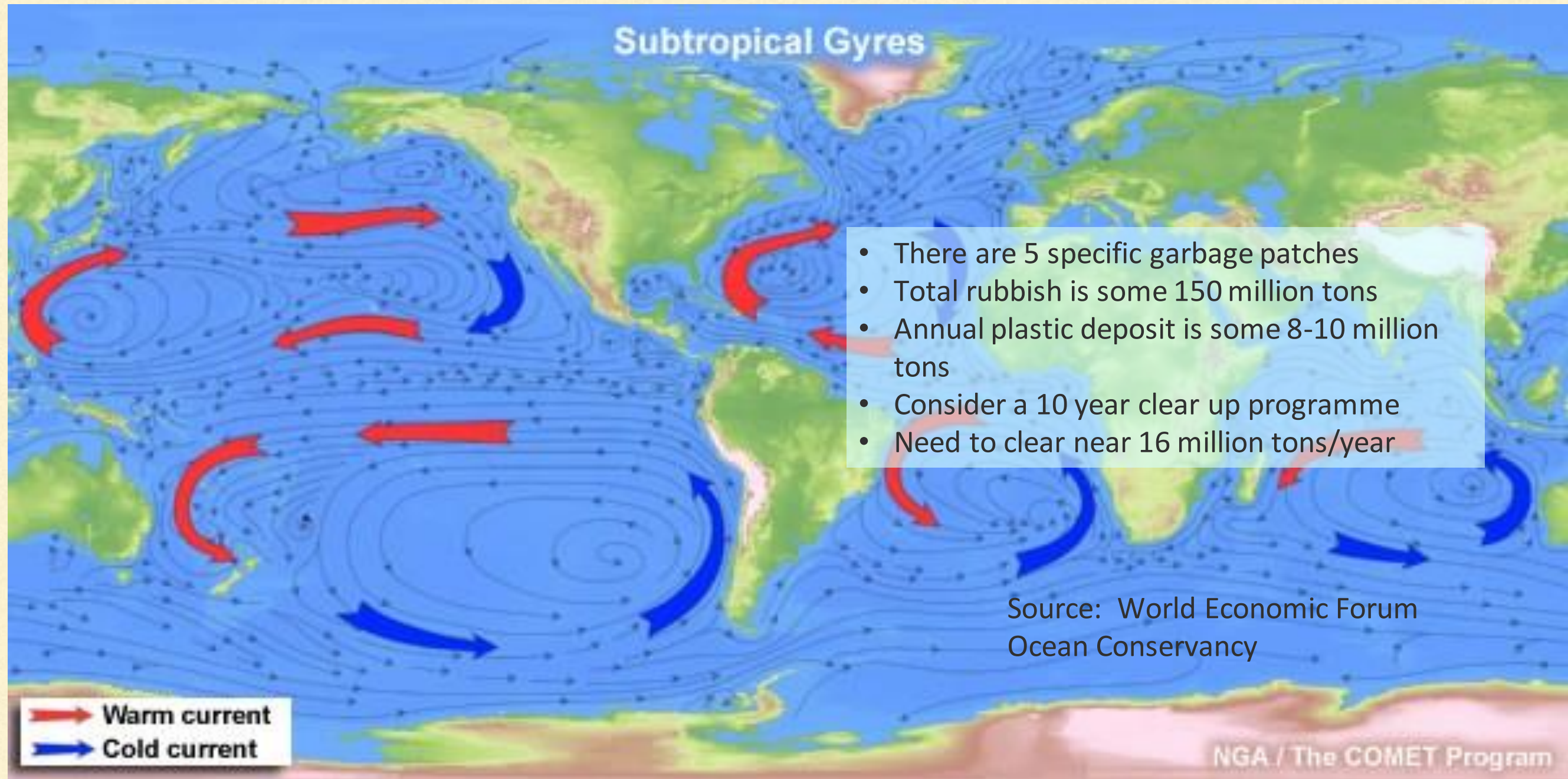
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1. Determine the size/context of the problem\*
2. Define reasonable boundaries and what is in/out – be realistic when setting bounds\*.
3. Identify possible solutions – where possible ROM cost (used to reduce options)
4. Do a Needs and Numbers assessment
5. Cost out (a) proposed solution (greater depth – if possible)
6. Present your findings/conclusions

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\* Could be in parallel/cyclical at outset to define problem

# 1. DETERMINE SIZE AND CONTEXT OF PROBLEM



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## 2. DEFINE REASONABLE BOUNDARIES – WLC?

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C

- Solutions to stop problem

A

- Assess solutions

D

- Development

M

- Use new material/solutions

I

- Embed in society

D

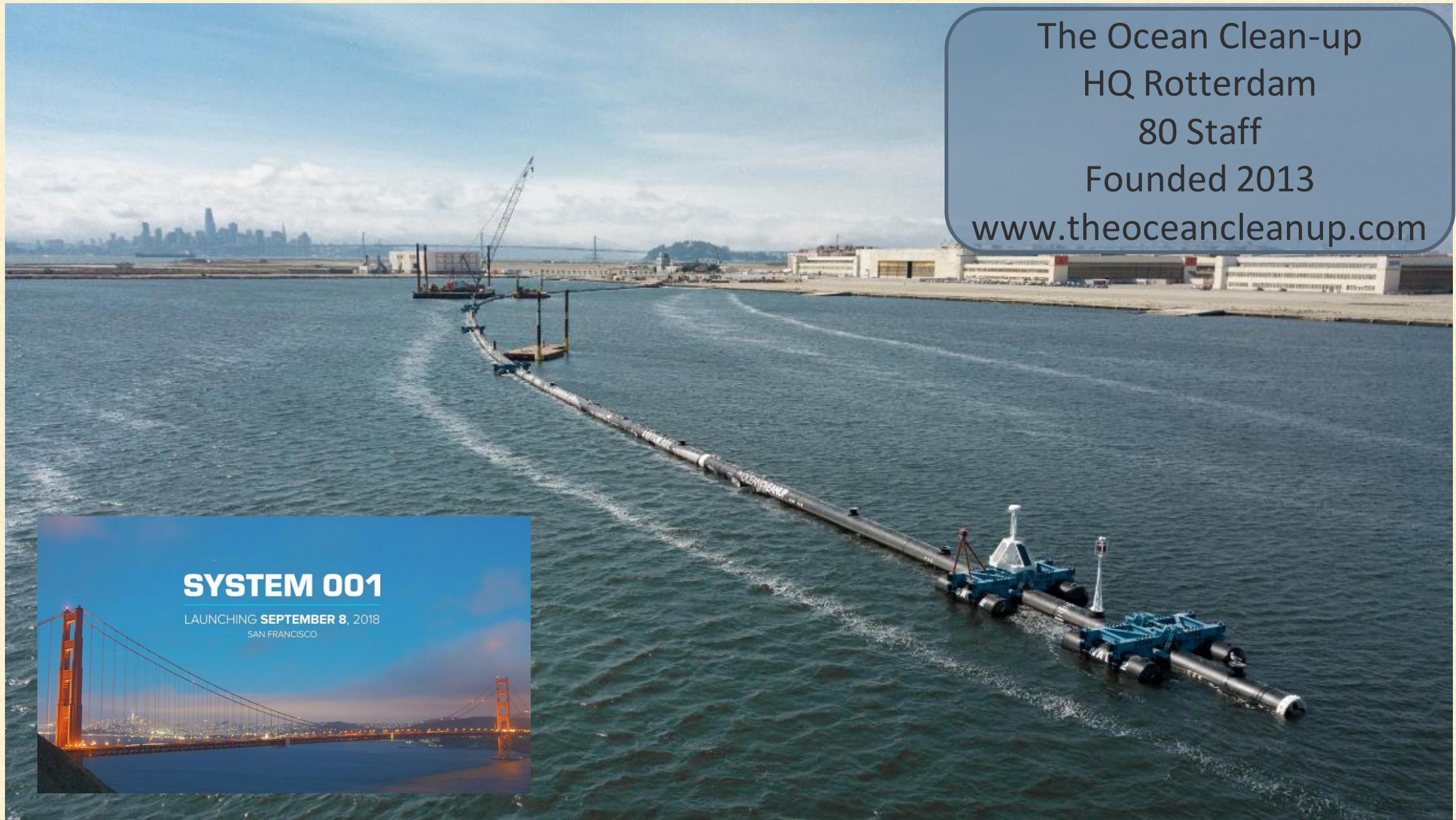
- Dispose / recycle / repurpose / re-use
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TAKING THE  
VIEW OF  
DISPOSAL/RE-  
USE/ RE-CYCLE  
STAGE AS OUR  
BOUNDS



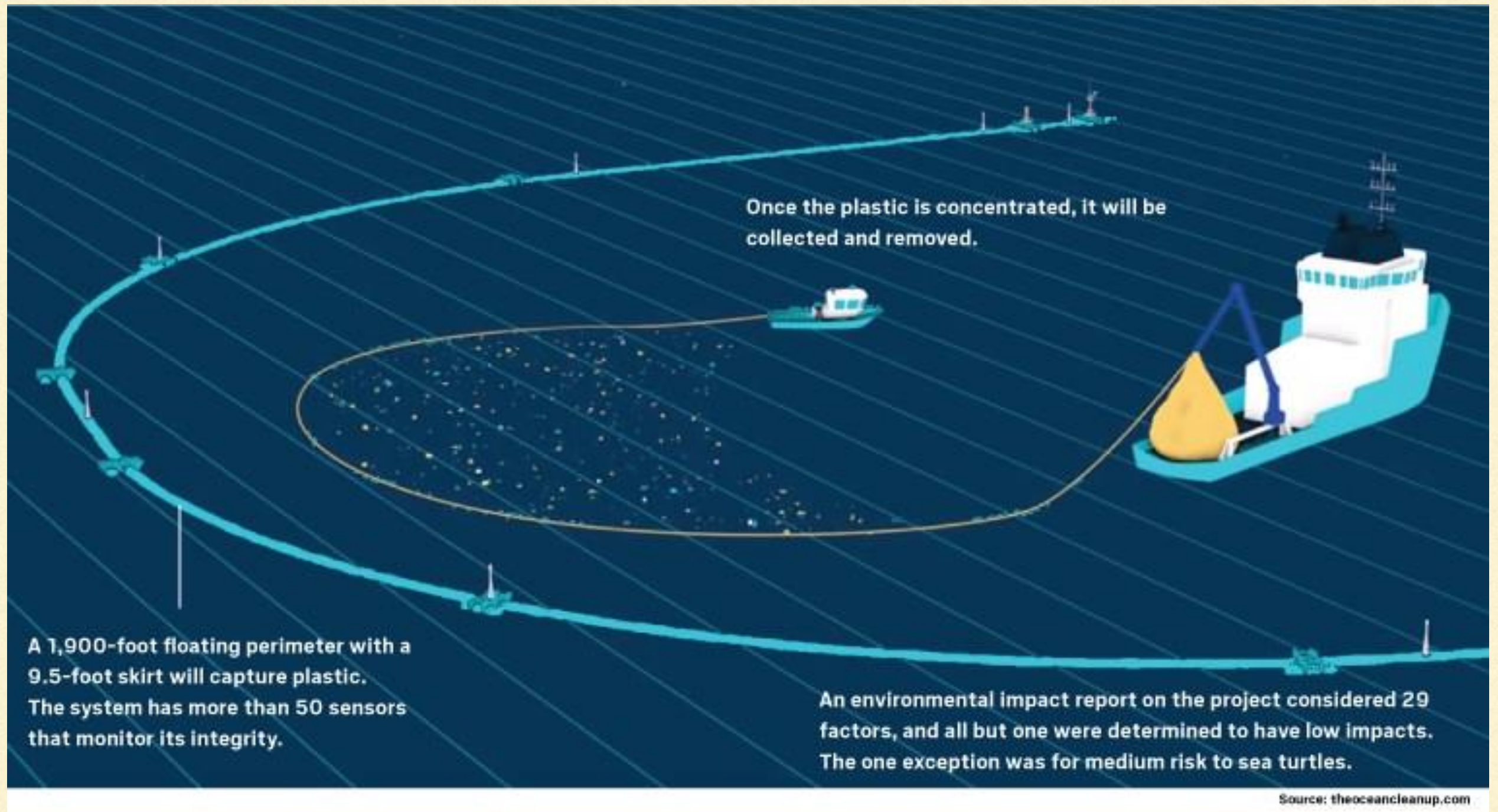
### 3. IDENTIFY POSSIBLE SOLUTIONS – EVALUATE



The Ocean Clean-up  
HQ Rotterdam  
80 Staff  
Founded 2013  
[www.theoceancleanup.com](http://www.theoceancleanup.com)

*Note – assumed we have assessed other options - exemplar*





- System 01 already in use in the Pacific
- Claims that 60 Systems could clear 50% of the great pacific garbage patch in 5 years
- Teams based in Rotterdam and California

## 4. DO A NEEDS AND NUMBERS ASSESSMENT

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Residual (million tons)	150	135	120	105	90	75	60	45	30	15
Annual Dump (million tons)	10	10	10	10	10	10	10	10	10	10
Actual annual (million tons)	160	145	130	115	100	85	70	55	40	25
Number of systems	500	500	500	500	500	500	500	500	500	500
Clearance per systems	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total annual clearance	25	25	25	25	25	25	25	25	25	25
New residual	135	120	105	90	75	60	45	30	15	0

# 5. COST OUT THE PROPOSED SOLUTION

	1	2	3	4	5	6	7	8	9	10
Cost of system (£m)	5									
Initial number of systems	500									
Life of system	2 years									
Replacement systems			500		500		500		500	
Procurement Costs (£m)	2500		2500		2500		2500		2500	
<b>Total System Cost (£m)</b>	<b>£12,500</b>									
Number of ships	5	5	5	5	5	5	5	5	5	5
Cost of ship (£20k/day)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Number of days	300	300	300	300	300	300	300	300	300	300
Annual ship costs (£m)	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
<b>Total Shipping Cost (£M)</b>	<b>£300</b>									

## Cost of HS2 is Estimated at £57 Billion

### Staff cost

- 80 current staff (technical + admin)
- 100 new operators per garbage patch (5)
  - 20 new support staff
  - = 200 x £60k/yr (inc. O/Hds)
  - **Total = £12m per year**

### Totals over 10 years

- Systems Cost £12,500m
- Ship Costs £ 300m
- Staff Costs £ 120m
- Total budget ~ £13 billion**

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## 6. PRESENT YOUR FINDINGS / CONCLUSIONS

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- International waters – who will pay – this leads back to purpose of model and assumptions.
  - High level of uncertainty across all numbers – low data readiness level
  - Moving problem from ‘A’ – ‘B’ – what do we do with the material we collect?
  - 10-year programme not feasible with this approach?
  - Investment challenges
    - Financial advisor – too much uncertainty and risk
    - Banker – upfront costs are high
    - Investor – low return on investment
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# TEAM PRESENTATIONS

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- Purpose of the model – where will it be used – level of detail required?
  - Life-cycle – setting the scene and context – prevention as well as dealing with current problem (breadth of approaches)
  - Understanding the problem – e.g. is the plastic mixed with other waste?
  - Clear process/approach being used essential
  - Comparing options to target problem
  - Great effort from all teams
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# GREAT TEAM WORK BY ALL

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