



## **IET Global Challenge – GreenSeas Trust brief**

Challenge and context information: Prepared by Fazilette Khan, Founder Trustee, GreenSeas Trust

### **Problem Statement**

Until recently plastic straws were considered an insignificant part of the marine debris problem but thanks to growing awareness there's now been a dramatic push by the public to reduce their use, and therefore their impact on our oceans and seas.

However, plastic straws are just a part of the problem. Many people aren't aware that cigarette filters are made of plastic fibres that do not degrade, and it's currently estimated that four *trillion* cigarette butts have made their way into our waters.

Cigarette filters are made of tightly packed cellulose acetate fibres, each approximately 20µm in diameter. Each cigarette butt can release thousands of these tiny fibres into our delicate marine environment, along with leaching the 200 toxic chemicals found in cigarettes into the water.

Today cigarette butts are the number one item found on beach clean ups, but sadly they're not simple items to remove from the ecosystem once they've made their way in.

### **Scenario**

On holiday last year in the Cannes, France, you engaged with volunteers from GreenSeas Trust who were giving out free pocket ashtrays to beach goers. You were shocked to learn that in an international beach clean-up over 1.8 million cigarette butts had been picked up in a single day.

It inspired you to join the GreenSeas Trust, where you are now working on a project to reduce plastic pollution on our beaches – specifically targeting the removal of cigarette butts.

Once cigarette butts reach the sea, it's a bit like closing the stable door after the horse has bolted. Therefore this project is designed to remove them from our beaches *before* they make it to the water.

The problem is that most beach cleaning machines are only capable of removing rubbish of a certain size. The majority currently work by collecting sand via a scoop

or drag mechanism, and then raking or sifting out anything large enough to be considered a foreign object. Cigarette butts are both small and light, and often fall through the rake or sifter.

Using your engineering skills you've been tasked with developing a new device that can better search out and remove cigarette butts, as well as other small marine contaminants that are currently found on our beaches.

### **Your Challenge**

To create a remotely controlled all-terrain machine that is capable of moving up and down the beach for a reasonable amount of time, picking up cigarette butts from the surface of the sand and collecting them in a chamber or hopper. The hopper will need to be large enough to collect a good amount as it would be manually emptied when full.

GreenSeas Trust believes changing human behaviour is also key to stopping plastics getting into the sea. Therefore the machine should attract the eye by using its size, colour or lights to grab the attention of beachgoers and help to educate them about the problem of people burying their cigarette butts in the sand.

The device should ideally be:

- Solar powered, allowing it work over extensive periods of time
- Sand, salt and water resistant
- Small, agile and intelligent enough to manoeuvre around obstacles on the beach (people, towels etc.)
- Big and bright enough to attract attention and help educate beachgoers