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ESG Summer Series

Surfing & sunscreen: The not so sunny side

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- The surfing industry depends on the health of the environment, yet its practices remain unsustainable
- Sunscreen is not safe either; harmful chemicals found in many sun care products threaten the health of marine ecosystems
- We think investor scrutiny of firms' commitments could help make recreational water activities more sustainably enjoyable

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This is the 7th report in our *ESG Summer Series* – looking at sustainability issues in less obvious places. These issues could grow to become bigger trends in the future.

Wetsuits heading for landfills: Every year over 8,000 tonnes of wetsuits are sent to landfills globally. Considering the limited circularity potential of the garment, risks persist for biodiversity and emissions from landfills. For an industry that relies on the environment, producing wetsuits from non-renewable sources is just the beginning of the impact. The process of making neoprene requires significant amounts of energy in the form of heat, from chemical reactions to shaping the garment. Roughly 90% of the fuel mix for industrial heat globally is fossil fuel based – therefore, emissions from both extraction and production processes of the garment are of key concern.

Toxic surfboards from start to finish: Usually made of plastic, surfboards have a multistage production process consisting of many toxic chemical components damaging to both humans and the marine ecosystem. Roughly 95% of all surfing waxes contain petroleum by-products, and alongside their production emissions, the chemicals often end up in the oceans as boards are used, damaging food chains and contributing to the micro-plastics problem. The plastics used in the boards are non-recyclable and non-biodegradable, making sustainable end-life options a challenge.

Marine damaging sunscreens: The sunscreen industry is growing globally due to rising demand for more expensive environment-friendly items and higher consumption in response to skin cancer concerns. With up to 14,000 tonnes of sunscreen washing into our oceans every year, focus must turn to the impacts on marine ecosystems. Common chemicals found in many sunscreens today have the potential to increase the rate of coral bleaching, impair the growth of green algae and result in fertility and immunity issues in marine life.

Searching for sustainable alternatives: We think investors could make a difference by scrutinising manufacturers' approach to reducing the environmental impacts of the water sports products that allow us to enjoy coastal ecosystems safely. Work is already underway to develop plant-based wetsuits and organic surfing wax, alongside extending both products' useful life. The focus on the forms of active ingredients used in sunscreens and product packaging is key to limiting harm to the environment. In our view, momentum must continue to develop more sustainable solutions for surfing and sunscreens.

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Surfing – relies on the environment, yet harms it

Sustainable wetsuits

Clothing for water sports significantly harms the environment, from production to disposal. Wetsuits are traditionally made from synthetic neoprene, which is produced by either of two non-renewable sources – petrochemicals or limestone. Although considered the greener alternative to oil-derived petroleum-based neoprene, limestone-derived neoprene consists of using a finite resource which too needs to be extracted and produced using significant amounts of energy.

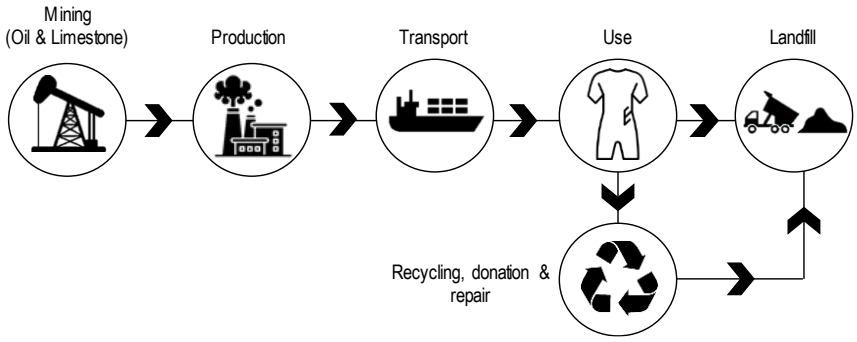
A highly heat-intensive process

The process of making neoprene includes a substantial amount of heat for chemical reactions and then again to shape the material to the desired fit. We identify the ESG challenges of industrial heat in our report *Decarbonising Heat* (31 March 2023), whereby fossil fuels represent around 90% of the fuel mix for heat production in industrial processes globally.

Over 8,000 tonnes of wetsuits sent to landfill every year

While emissions from the extraction and production processes of neoprene are of key concern, disposal and end-life decisions have the potential to include landfill challenges, such as contributing their emissions due to the lack of biodegradability. In the UK alone, 380 tonnes of neoprene wetsuits end up in landfills each year[1]. This number increases to over 8,000 tonnes globally[2]. A quality wetsuit can last between one to five years and the average surfer replaces their wetsuit every two years, implying that sustainable end of life processes are key to reducing the landfill impact[3]. Even considering neoprene recycling schemes to produce items, such as yoga mats, laptop cases and drink holders, the material will eventually end up in landfills and contribute to landfill emissions and biodiversity risks to surrounding ecosystems via chemical pollution into water and soil, and airborne dust/waste from sites.

1. Lifecycle of the average neoprene wetsuit



Source: HSBC (2023)

Developing sustainable solutions

Developing alternative sustainable materials and extending product life-span (repairs, reuse/donation, resale or rental) are the most effective solutions to create a more circular wetsuit model. A material that has been increasing in popularity is Yulex. This plant-based rubber is produced from Hevea trees and is naturally grown and harvested. The process claims to reduce CO_2 emissions by 80% compared to neoprene[4]. However, as the popularity of plant-based products grows, we must be cautious of deforestation impacts. Companies and organisations that are working to extend the life of wetsuits and develop alternative materials are summarised in Figure 2.

1 Finisterre, 2018
2 'Surf champ Lucy Campbell says her sport must be greener', BBC, 16 May 2023
3 'How to Recycle an Old Wetsuit', Professional Association of Diving Instructors (PADI)
4 'Yulex Natural Rubber', Patagonia

2. Wetsuit sustainability players

Sustainability focus	Companies and organisations
Production	Finisterre, Patagonia, SRFACE
Recycling	Patagonia, KASSIA+SURF, Lava Rubber, Need Essentials, Green Guru Gear, Rip Curl (Australia), Reborn Rubber, Suga, Néocombine (France)
Reuse/donation	Surfpop, AmpSurf, RERIP, Warm Current
Repairs	Need Essentials, Bodyline Wetsuits, Techneopro Ltd

Source: HSBC, Professional Association of Diving Instructors (PADI)

Toxic surfboards

Plastics dominate the industry

From production to disposal, surfboards encompass multiple risks to the environment. Usually, surfboards are made from the polymer polyurethane (PU), which is heated inside a mould to form a foam. The boards are then coated in fiberglass cloth and polyester resin, which laminates the board. Polyester resin has risks to both human health – via inhalation and skin irritation – and the environment via water and soil pollution, with potential biodiversity impacts. Across the production process, a significant amount of waste is produced, from foam offcuts to excess resin. Sustainable disposal is key to limiting environmental impacts, yet often production waste ends up in landfills or is dumped[5].

Surf wax does not have to be this harmful

During the surfboard's lifespan, wax is applied to help surfers maintain grip and balance for better performance. It is often produced from paraffin, which is a by-product of petroleum refining. Alongside the emissions impact of petroleum processing, the process involves the use of highly damaging chemicals called dioxins. Those exposed to dioxins regularly can experience impairment of the immune system and reproductive functions, as well as cancer risks[6]. Once the product reaches consumers, risks to human health and marine life aren't over. Wax often washes off boards and enters the marine ecosystem, where it is ingested and moves into the food chain, as well as contributing to the problem of micro-plastics.

95%

Percentage of surfing waxes containing petroleum by-products[7]

Exploring alternative options

Sustainable alternatives are growing in popularity across the surfing industry. From plant-based resins to organic wax and traction pads, work is underway to reduce the industry's environmental impact. Mushroom (mycelium) is an innovative material that can help replace plastic surfboards. The mycelium roots grow to form a polystyrene-like material, which is great for shaping a surfboard and doesn't harm the environment once it breaks down[8]. Opportunity also lies in nutshell oil, which once mixed with the right catalysts, creates a foam-like substance for the surfboard's core[9]. Combining the automotive and surf industries, Jaguar Land Rover has been recycling used PU foam into surfboards and paddleboards to reduce the volume of plastic waste that is sent to landfills[10].

End-life possibilities

Once the board has reached end-life, either by breaking or being damaged beyond repair, the components present a sustainability challenge for disposal. PU is non-recyclable and is non-biodegradable. As surfboards break in the ocean they release chemicals, or if onshore they simply

5 'Riding the Green Wave: Sustainability in Surfing', Surfd, 10 May 2023
6 'Dioxins and their effects on human health', World Health Organization, 4 October 2016
7 'Is Surf Wax Toxic? Here's Why You Should Buy Eco-Friendly Wax', The Inertia, 28 September 2018
8 'Environment: Are mushroom boards the future of surfing?', BBC, 19 February 2023
9 'In A Nutshell: The Journey to a More Sustainable Surfboard Blank', Cord Surfboards, 28 March 2023
10 'From waste to wave: Jaguar Land Rover launches surfboard made from recycled plastic', Jaguar Land Rover, 2017

end up in landfills, contaminating surrounding ecosystems. Integrating recycling/repurposing schemes and secondary markets is key to extending the product's life – ultimately reducing the amount of plastic produced and damage caused by the toxic chemicals contained inside.

Surfing industry helping protect the environment

There are some bright spots, as there are examples of the surfing industry helping to conserve and restore ecosystems, often supporting the establishment of legally enforced conservation areas. The World Surfing Reserves is a programme that aims to protect surfing ecosystems around the globe. North Devon in the United Kingdom is the latest to be designated as a reserve – protecting over 30km of coastline[11].

Sunscreens – a big business with big impacts

Increased consumption will likely cause more sunscreen being washed into the ocean

The sunscreen industry is growing globally. According to *Fortune Business Insights,* June 2023, the sun care products market could grow from cUSD14bn in 2022 to USD20bn by 2030. Rising demand for more expensive environment-friendly items with a higher sun protection factor (SPF) and higher consumption due to skin cancer concerns are the key drivers. We think this increased consumption will bring enhanced stakeholder focus on the environmental impacts of sunscreens, as it is estimated that between 6,000 tonnes and 14,000 tonnes of sunscreen wash into the ocean yearly[12].

How sunscreen chemicals can affect marine environments

Chemical sunscreens can negatively affect marine life

In our view, investors should consider how common chemicals used in sunscreen products threaten corals and other marine life. Chemical (organic) sunscreens often include active ingredients to absorb the sun's ultraviolet rays, such as oxybenzone (benzophenone-3) or octinoxate (ethylhexyl methoxycinnamate)[13]. Research suggests that corals, for example, have an increasing rate of bleaching in response to high concentration of oxybenzone due to a loss of zooxanthellae[14] (single-celled algae that live within most types of coral polyps and help the coral survive by providing it with food resulting from photosynthesis)[15]. Also, chemicals can affect fertility and cause other issues to marine life, as Figure 3 suggests. While some countries and territories banned the sale or use in some places of sun protection products that contain marine life-damaging chemicals (e.g. Hawaii, the U.S. Virgin Islands, Thailand, the island of Bonaire), they continue to be allowed for use in cosmetic products worldwide[16].

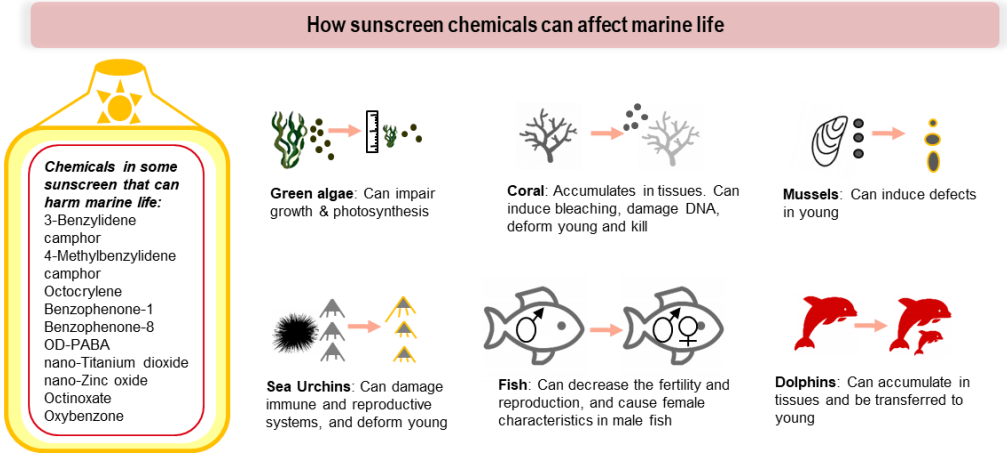
Water resistance and non-nano ingredients should be in focus

We think investors could make a difference by scrutinising manufacturers' approach to reducing the environmental impacts of sunscreens. Many companies now claim that their products are 'biodegradable' or 'reef safe' when based on zinc oxide or titanium dioxide (so called physical or mineral sunscreens that reflect ultraviolet rays from the sun). However, according to the OECD, the label 'ready biodegradable' can be given to a product that reached a sufficient (but not full) extent of biodegradation in one of the OECD 301 tests within a 10-day window. Studies also suggest that nanoparticulate forms (micronised to less than 100nm in size) of zinc oxide or titanium dioxide, the use of which has increased in the last decade due to their less opaque appearance, can damage marine mussels, algae and other sea creatures[17]. Furthermore, these

11 'North Devon, UK is dedicated as the 12th World Surfing Reserve', Save the Waves Coalition, 13 May 2023
12 C Downs et al., Toxicopathological Effects of the Sunscreen UV Filter, Oxybenzone (Benzophenone-3), on Coral Planulae and Cultured Primary Cells and Its Environmental Contamination in Hawaii and the U.S. Virgin Islands, Archives of Environmental Contamination and Toxicology volume 70,
13 The science of sunscreen, Harvard Health Publishing, 15 February 2021
14 C Downs et al., Toxicopathological Effects of the Sunscreen UV Filter, Oxybenzone (Benzophenone-3), on Coral Planulae and Cultured Primary Cells and Its Environmental Contamination in Hawaii and the U.S. Virgin Islands, Archives of Environmental Contamination and Toxicology, 70(2), February 2016
15 National Ocean Service, Zooxanthellae ... what's that?, Corals Tutorial
16 See, for example in the EU, List of UV Filters Allowed in Cosmetic Products, Annex VI of the Cosmetics Regulation (EC) No. 1223/2009; advice on a concentration limit is also available
17 See, for example, E Muller et al., Impact of engineered zinc oxide nanoparticles on the energy budgets of Mytilus galloprovincialis, Journal of Sea Research, 94, November 2014; or C Corinaldesi et.al., Impact of inorganic UV filters contained in sunscreen products on tropical stony corals (Acropora spp.), Science of the Total Environment, October 2018

inorganic UV filters are often coated with other chemicals that also can change their physiochemical properties and affect the aquatic environment[18].

3. Sunscreen Chemicals and Marine Life



Source: NOAA's National Ocean Service

Sunscreens based on zinc oxide or titanium dioxide may still be harmful

As implementing new environmentally friendly ingredients into sunscreen formulations is crucial but quite difficult due to human safety concerns and regulations regarding animal testing, we think the focus on non-micronised versions of the active ingredients is key in recreational water activities. Organisations, such as the Environmental Working Group, provide a database of sunscreens and their ingredients to help stakeholders assess the environmental impact of sun care products. For example, some brands (e.g. Suntribe, Thrive, Thinksport, Stream2See) state that they use only non-nano or clear (e.g. Badger) zinc oxide or titanium dioxide in their sunscreens. As researchers work on new methods to produce zinc oxide – making it less energy-intensive and cheaper as a result[19], we think more manufacturers will revisit their formulas soon.

Packaging

Scope to use environmental friendly packaging solutions

In our view, stakeholder attention on reducing the impacts of packaging will continue to increase, as many plastic sunscreen bottles are difficult to recycle and may not be accepted for home recycling[20]. Some brands now use recyclable 'green' bio-plastic containers (e.g. Coral Sure, created by farming sugarcane on sustainable land), plastic-free recyclable packaging, such as aluminium, tinplate (Sol de Ibiza) or glass (e.g. UpCircle), and refill options (e.g. SurfDurt). We think these moves will help reduce the percentage of plastic packaging ending up in landfills.

In conclusion…

In our view, investors should continue to scrutinise companies' commitments in the water sports and sunscreen industries; future improvements should focus on recycling and extending wetsuit and board life, developing innovative materials, implementing non-micronised and new environmentally friendly ingredients in sun care products. Over time, investor input could, we think, help make recreational water activities more sustainably enjoyable.

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Chicken eggs: Race to "cage zero", 10 August 2023
Heat on holidays: tourism in a changing climate, 3 August 2023
How sustainable is your morning coffee?, 26 July 2023
The menu: An exclusive edible insect excursion, 20 July 2023
Dead or alive – the worth of a tree, 13 July 2023
Ice cream: deliciously sustainable?, 6 July 2023

18 S Heilgeist et. al., Finding Nano: Challenges Involved in Monitoring the Presence and Fate of Engineered Titanium Dioxide Nanoparticles in Aquatic Environments, Water, 13(5), 2021
19 University of Sheffield, Affordable reef-safe sunscreen promised by new, more sustainable way to make zinc oxide, April 2021
20 Recycle, Take-back schemes for beauty and grooming packaging that is difficult to recycle, 2023

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