biobus

Exhibit Booklet

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Contents

Harvesting sustainably.

We all know that cows are a big source of the **greenhouse gas methane**. Does this mean we need to give up beef and dairy forever, or can we get these things **sustainably**? Well, the Farm Zero C project is trying to establish the world's first cabron neutral dairy farm in Cork. It's a partnership between BiOrbic, Carbery and Shinagh Farm. **Renewable** energy, methane-reducing feed additives, nutrient-storing grasses and new farming practices are just some of the things they're looking at. Who knows, you might see some **carbon-neutral** dairy products in your supermarket soon!

https://biorbic.com/farm-zero-c/

Bio-based alternatives.

We make a staggering 300 million tons of plastic every year - enough to wrap the world in plastic! As you now know, plastic is made from **petroleum** and doesn't biodegrade. **Bioplastic** is an alternative scientists are developing and it can either be **bio-based** (made from living things), **biodegradeable** (able to broken down by living things) or both. Bioplastech is one company of scientists making bioplastic that is both bio-based *and* biodegradeable. You'll see a lot of bioplastics in the rest of our examples. Just like plastics, we need a variety of types for different jobs, from thin films for food to hard plastic for toys!

https://www.bioplastech.com/

Finding uses for waste.

Like anything, making beer produces **waste**. Mostly this means a lot of dirty wastewater that has to be cleaned, often with harmful **chemicals**. But can we clean this water in an **eco-friendly** way *and* make something useful at the same time? This is the aim of the AlgaeBrew project. They're lookng at how to grow algae on brewery wastewater to clean the water in a natural way. The algae can then be harvested for EPA, which is a nutrional supplement we currently get from strained fish stocks. This would be a much more **sustainable** and resourceful way of getting it!

https://www.ucd.ie/algaebrew/

Restoring biodiversity.

In Ireland, 62.9% of land is used for agriculture. That means if we want to create **habitats** (homes) for natural species, farms will need to play a big part. But where can a farmer start? How can they get guidance to help them increase **biodiversity** on their insividual farm? BiOrbic researchers are working on an app that will help them do this. Using **machine learning techniques** and **satellite imagery**, the app will suggest actions a farmer can take based on their farms data. This is just one project aiming to **restore biodiversity** so we can support our **bioeconomy**!

Fiáin

The wax and wane of petroleum candles.

As you saw in the bus, most candles, crayons and even some cosmetics are made from **paraffin wax**. It comes from **petroleum**, which mean it's not so sustainable and we need an alternative. This is where **plant-based wax** comes in. Any plant that produces oil has the potential to be a source of wax. This includes soybean, coconut, rapeseed, sunflower and more! Galway-based company Fiáin are one supplier that uses 100% natural plant-based wax, hand pours their candles and uses cotton wicks. And if you aren't into candles, you can always try out their plant-based soaps!

www.fiain.ie

DOOLEYS Wool

How did ewe sleep?

As you may have seen in our exhibit, many pillows and other soft items are stuffed with **synthetic materials** like **polyester fiberfill** or 'polyfill'. This means we're still relying on non-renewable crude oil and we're adding more waste to the environment.

As an alternative, pure wool is a **renewable** and **biodegradable** natural fibre that we can produce **locally** in Ireland. Companies like Dooley's Wool provide these sutainable options, so why not consider them next time? It'll definitely help you sleep at night!

https://dooleyswool.ie/

Tirlán

Don't throw it a-whey!

What if you could turn your **waste** into something **even more valuable** than what it came from? That's what happened to whey! When making cheese, milk is separated into fatty curds and a sweet liquid known as '**whey**'. About 80-90% of the milk is removed this way. But whey is very nutritious, having a good balance of all the proteins we need to build muscle. Scientists like those at Tirlán found out how to turn it into **protein powders** for athletes, bodybuilders and fitness fanatics to use as supplements. And because it sells for a good price, it's now extra income for farmers!

https://www.tirlan.com/

SEABODY™

Making waves in health and beauty.

Cosmetics can **pollute** the environment in a number of ways, whether it's the **plastic packaging** or the harmful **petrochemical** ingredients. However, some cosmetics companies are now looking towards **seaweed** as a sustainable, eco-friendly source of micronutrients for our skin. Seaweed farms don't take up precious land space and the crops store carbon as they grow. SEABODY is one Kerry-based company that uses seaweed ingredients, as well sourcing **sustainable, recyclable materials** for their packaging.

https://seabody.com/

Life in plastic? Not fantastic!

How do we replace handy **disposables** like plastic bags, gloves and sponges? Scientists have now been able to engineer plastic-like materials that are made from plants rather than crude oil. Some **bioplastics** can be made from vegetable starches and can decompose like food waste at a **composting facility**. Various options have already infiltrated the market replacing all kinds of plastic products, so look out for them near you. By choosing **compostable bioplastics** for your household, you're actively reducing plastic waste, protecting our planet in the long-term!.

https://www.getgreenaware.ie/

Considerate coffee.

It's time to wake up and smell the coffee. The planet is suffering from serious **biodiversity loss** and we need to take action. While we can do this locally in our own gardens and communities, we can also help **biodiversity projects** through our purchases. For example, Green Ocean Coffee is directly supporting Irish coastlines, creating new oyster and seagrass beds that **store carbon** 35 times faster than rainforest. Each bag purchased equals 1m² of new habitat. Why not try a cup from our BioBus cafe?

https://greenoceancoffee.ie/

BARRY'S TEA

Promoting sustainabili-tea.

Did you know that tea bags can be made from **plastic**? In order to help keep their shape in hot water, bags can be sealed with a plastic called **polypropylene**. While this may help infusion, it's not great for our environment. That's why many tea brands, including Barry's, have switched to 100% biodegradable bags that can be **composted industrially**. Barry's provide a handy guide on how to correclty dispose of each part of their packaging on their website. Why not try a cup from our BioBus cafe?

https://www.barrystea.ie/sustainability/

Skyscraper®

Bio-based brandables.

By now you should have a good idea of just how many items we use on a daily basis that are **petroleum-based**. **Bio-based** products are slowly coming to market but they are still few and far between. What if you're an organisation in need of **eco-friendly** branded merch? Skyscraper is a Kerry-based company that provides a good range, from plantable-pens, to hemp coasters, to bamboo flasks. It's a one-stop **sustainable** shop!

https://www.skyscraper.ie/

Investing in liquid assets.

Fuel and energy are the first things we think of when it comes to **fossil fuels**. And for good reason. It makes up 86% of fossil fuel use. **Green electricity** is one solution but it has limitations, such as energy output, reliability and need for battery storage.That's why it's important we also have **liquid fuel** that is **bio-based**. For example, Certa produces bio-diesel from **hydrotreated vegetable oil**. It's mainly used by commercial operators right now but will be coming to household boilers very soon, so keep an eye out!

https://certaireland.ie/

From grub to scrub!

As you now know, **cleaning** products often contain **petrochemicals** to dissolve dirt, disinfect surfaces and release lovely perfumes. But unfortunately, these ingredients are *not* so great at keeping our enivronment clean. So are there more **eco-friendly** solutions? Well, UK-based brand, Ecover, has managed to create a multi-purpose cleaner that is 97% **food waste**. They've found clever ways of replacing their traditional ingredients with unused fruit, supermarket food waste, potato peelings and even the alcohol removed from alcohol-free beer!

https://www.ecover.com/

Yes it does grow on trees!

Lithium-ion batteries are everywhere but did you know their core component, graphite, is a **fossil carbon**? It's either mined or made from other fossil-based materials and it's **not bio-degradable**. Still, what can we do? It's not like carbon grows on trees...

Well actually... of course it does! **Lignin** is a renewable source of carbon and it makes up 30% of a tree's dry mass. We even extract lignin as **waste** when we make textiles out of wood. The powder in our exhibit is a new, hard carbon made from tree's lignin, created by Finish company, Stora Enso. Although not yet in the market, this could soon be the future of how we power lithium-ion batteries!

https://www.storaenso.com/

MoEa

Fruity two shoes.

Ever wondered what your sneakers are made of? Polyurethane, polyester, leather...so many materials and so many of them **petroleum-based**. This often leads to old sneakers clogging up **landfills**. Some fashion brands are trying to reduce their negative impact by changing the materials they use. MoEa for example makes sneakers out of **fruit waste**! Grape, apple, pineapple, and orange waste, (which would otherwise be burnt), is mixed with cotton or recycled plastic. Although **100% bio-based** sneakers don't exist *yet*, MoEa's shoes are a great step in the right direction!

https://moea.io/

Don't toy with our future!

Toys are all fun and games until you realise how much **plastic** we're consuming. While there may be wood or fabric toys available, we can't deny that plastic is a great, lightweight and durable material that's perfect for playing with. Fortunately, you can now find some toys made of **bioplastic**. BiOBUDDi, a company from the Netherlands, is pioneering the sustainable toy market with their blocks made from **sugar cane**. **Note**: bioplastics can still pollute the environment if they're not disposed of correctly but they *are* made from **renewable** plants and have a **lower carbon footprint**.

https://biobuddi.com/

A fresh lick of paint.

We spend up to 80-90% of our time in enclosed spaces. That's a lot of exposure to any chemicals that might be coming from our indoor surfaces. But did you know that most paints, woodstains, varnishes and oils have **petrochemicals** in them and some of these can be **allergenic**? We can find ways to create these products differenty. Biofa, for example, is a German company that aims to provide **chemical-free** DIY products that are healthier for consumers. Their range also comes from **90% renewable** sources which is not only great for our health but also for the health of the planet!

https://www.biofaireland.ie/

Green enough to eat off of.

Convenience often comes at a cost: **single-use** items like plastic cups, plates, cutlery and packaging all contribute to our mounting **waste** problem. These disposables **don't decompose** and clog landfills. While reusable cups and bags are being encouraged, its unlikely we'll ever live in a world completely free of disoposable food packaging. So if we can't use plastic disposables how about **compostable** ones? Edinburgh-based Vegware is one company that creates bioplastic from **plant sugars** to make a wide range of products. And they can all be **industrially composted**!

https://www.vegware.com/

Reducing plastic, period!

Disposable period products - pads, tampons and applicators - generate about 200,000 tonnes of plastic waste per year. Much of these products will take thousands of years before they fully decompose. Now-a-days, there are reusable alternatives to single such as menstrual cups and absorbent underwear. But for those who prefer the single use system, there are also great alternatives. For example, period products that are 100% bio-degradable and do not contain any of the toxins that can be found in typical ones!

https://www.hereweflo.co/

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Our final thoughts

We're still on a journey.

The best consumption, is no consumption

Supplying food and products will always have *some* impact, so it's still important to only consume what we need. We have to change our culture to one that's more careful with our planet's resources if we want a secure future.

Be careful with 'green' terms

Biodegradeable isn't a regulated term. It means that microbes can break something down, but not *how long* that would take or *what* it breaks down to. Compostable is a better term to look for as it means something can be broken down to compost. Keep an eye out for other terms and their true meanings!

Our waste disposal system is still messy.

Industry is getting better at dealing with our waste but right now, it's still difficult to separate and sort it. That's why in the meantime, your help cleaning, drying and sorting your waste is crucial. Find out how to dispose of just about anything on **mywaste.ie**.

Don't ever stop learning

Our society is in a state of radical change, so whether you're still in school, or school was a distant memory, there will always be more to learn! It's our job to make that easy and accesible, so do check out our resources and let us know how we can help. **biorbic.com/society**

Direction over perfection

Sustainability is a vast concept and there's always room for improvement. But we don't need a *few* people doing it perfectly, we need *lots* of people doing it imperfectly. Let's focus on taking small positive steps, and we'll be more likely get there!

Glossary

Biodegradeable - can be broken down by bacteria or other microorganisms.

Bio-based - made from living things such as plants, animals or microbes.

Bioeconomy - Getting what we need from living things such as plants, animals and microbes.

Biodiversity - a variety of different species existing together.

Carbon footprint - the negative effect something has on the Earth's atmosphere.

Carbon Neutral - not producing excess greenhouse gases.

Compostable - able to be made into compost.

Fossil fuels - the decayed matter of old creatures, found in the ground, that we use for energy and materials.

Greenhouse gases - gases that trap heat in the Earth's atmosphere, like carbon dioxide, methane and nitrous oxide.

Industrially compostable - able to be made into compost in an industrial setting (with extra heat and pressure).

Petroleum - A fossil fuel found in the Earth's crust.

Petroleum-based - Made with petroleum ingredients.

Pollution - When harmful materials enter the environment.

Renewable - Something which has a continuous supply. As opposed to non-renewable, which has a limited supply.

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Science Foundation Ireland sfi For what's next