



# MO.ONSHOT

RECIPE BO.OK

*allbirds*

# Hello There,

Thank you for reading this. I know there's a lot of brand paraphernalia floating around, so your investment of time and attention is appreciated.

## ***But let's cut to the chase: we need your help.***

We created Allbirds to reverse climate change through better business, and our North Star has been reducing carbon emissions – and clearing a path for others to follow so we can make a more meaningful impact.

We label all of our products – and every transaction – with their carbon footprints. We don't think carbon is the *only* way to measure sustainability and environmental impact, but, like calories on a food label, it's a pretty good, universal indicator.

We set out to do something groundbreaking, and that's where M0.ONSHOT comes in. It's the world's first shoe that not only achieves net zero carbon emissions, but is also commercially viable and scalable.

## **But its meaning is the same as its footprint – zero – if it's just Allbirds using these breakthroughs.**

So we've created this Recipe BO.OK (yes, we're now tied to that wordplay) to help any others who are interested in joining us on this net zero carbon journey.

## **We really want you to take our work and apply it to your own products.**

You can take individual chapters, or the whole thing, whatever works.

And, let's be clear, the M0.ONSHOT toolkit and shoe are not perfect answers. We're still in early days. For instance, M0.ONSHOT is the first time we've been able to account for both on-farm carbon emissions and sequestration in a product's carbon footprint. (More on that later.) This is a new way of doing things. It doesn't tick all the same boxes as the previous ways of doing things. And we're excited about that because, without asking new questions, we're never going to get new answers. We are proud to pioneer this approach and, in turn, support changes and efforts made by growers to capture carbon.

So yes, this is different. But different doesn't have to be scary. We're boldly stepping into this approach, because there is no such thing as perfection in this mission. **We can't stall progress in pursuit of perfection.**

This is progress, and we're so proud of the step forward that M0.ONSHOT represents. With your help, we can make even more progress.

## ***Join Us.***

*Tim Brown*

**Tim Brown**  
Co-Founder and  
Chief Innovation Officer,  
Allbirds



RECIPE B0.0K

# Contents

01 DESIGN

02 MATERIALS

03 PACKAGING

04 MANUFACTURING

05 TRANSPORTATION

06 END-OF-LIFE

07 CARBON MEASUREMENT + LABELING

08 CARBON SEQUESTRATION

09 OUR PARTNERS

01

# DESIGN

+

RECIPE BO.OK

In an industry often enamored with piling on ‘stuff’, creating a net zero carbon shoe demands a mindset of minimalism. But doing less isn’t easy. And, as it turns out, creating net 0.0 kg CO<sub>2</sub>e products really isn’t easy. So we want to share the design principles and practices that have informed our pursuit of... well, nothing.

## Allow The Materials To Drive The Design

Creating net zero-carbon products requires us to think deeply and honestly about the raw materials we’re using, right down to their molecules.

Before we ever dreamt of a design for a net zero carbon shoe, the idea of regenerative wool began percolating. Our hunch was this super natural material could be carbon negative when optimally produced. That hunch was confirmed after an examination of [Lake Hawea Station \(LHS\)](#) in New Zealand – the country where much of our wool is grown, a place as picturesque as it is innovative – affirmed the farm to be net carbon zero, meaning it sequesters more carbon than it emits.

LHS’s carbon negative wool allowed us to reimagine a fundamental principle of sustainable design: instead of constantly trying to reduce, suddenly we were encouraged to use more of a material.

We needed to use more of the carbon negative wool to help us counter other more stubborn parts of the carbon equation. It became an exciting dance between maximalism and minimalism.

We explored dozens of different ways to maximize our use of the material. Months of tinkering, testing, and fine-tuning (to the utter delight of our product development team) landed us on a shoe fully wrapped with the carbon negative wool.

## Distill Down To Only What Is Essential And Pure

Our original Wool Runner was designed as singular celebration of wool, stripping away everything superfluous to allow the wool to be the hero. M0.ONSHOT takes this pursuit of purity to the next level.

Having already maximally minimized a shoe with the Wool Runner, we followed the same approach with M0.ONSHOT, but amped the wool way up. The entirety of the shoe is wrapped with carbon-negative wool... and we didn’t stop there.

Using learnings from our SuperLight collection, we reimaged the traditional insole by integrating it into the finished upper of the shoe. This helped us reduce the number of components needed to make the shoe, while also getting more cushioning foam underfoot. This “overlast construction,” (excuse the nerdy footwear terminology, handy glossary [here](#)), also meant we could use more carbon negative wool in the upper, again contributing to a lower carbon footprint.



## Form Follows Function

The sole purpose of the M0.0NSHOT project was to create a net zero carbon product. We never muddled up that mission. It informed every design decision.

We knew we needed to maximize our use of the carbon negative wool to counteract more carbon-intensive parts of a shoe's lifecycle to level out at net zero. So we applied the material around the entirety of the shoe. Not only did this nudge us toward our net 0.0 destination by bringing down the carbon footprint, it also lent each prototype a striking, even futuristic appearance. (The shoe of the future can't look like a thing of the past, right?)

Initial prototypes revealed indicative carbon footprints below net 0.0 kg CO<sub>2</sub>e, which left us some buffer to play with other design features like dyes. We tried out different colors and combinations, ultimately opting for gray for our Copenhagen reveal. This maintained the integrity of the wool as the hero material, while adding to the uniform look and offering more resilience to discoloration.



## Where We Need You

The M0.0NSHOT is a way of making. The celebration of super natural materials and the pursuit of low carbon is not a singular concept, so its potential interpretations are vast. We're excited to see what your version of M0.0NSHOT looks like. We need you to take this toolkit of ingredients, and apply it to your own products. Because one shoe isn't enough. And, if we can help you on that journey, let us know.



02

# MATERIALS

+

RECIPE BOOK

# Materials

## Carbon Negative Wool

M0.ONSHOT's upper is made with carbon negative wool grown on Lake Hawea Station (LHS) in New Zealand. The wool is considered carbon negative because the farm sequesters more carbon than it emits. (Check out [carbon sequestration](#) to learn more.)

## Plastics from Passed Gas

One of the criticisms of traditional sheep farming is that the animals release a lot of methane – a greenhouse gas 30 times more harmful than carbon – when they, well, fart and burp. So we partnered with [Mango Materials](#) to use cutting edge methane-capture biomaterial<sup>1</sup> to produce components like logo badges.

Mango Material's revolutionary process employs microorganisms, a species of ancient "bacteria," that eat waste methane and produce a material that can be made into highly functional bioplastics. So we've taken something historically a nuisance – methane emissions – and recruited it to work on our behalf. Methane, when used correctly, can be a partner in the fight against climate change! We bet this is an enemy-to-lover plot you didn't see coming.



## Where We Need You

While we have a deep love for wool, we also believe that variety is the spice of life. So we'd love to find even more options for fibers and polymers that can be made into yarns and textiles that act as carbon sinks. (Materials that pull more carbon out of the atmosphere than they release during production) With more options for carbon-negative uppers, the opportunities for designs and silhouettes become limitless.

## Sweeter SweetFoam®

M0.ONSHOT's midsole and outsole are made with SuperLight Foam, our lightest and lowest carbon foam ever, composed of approximately 70% bio-based content.

SuperLight Foam is an evolution of Allbirds's first ever bio-based midsole foam, SweetFoam®, which launched in 2018. Similarly to SweetFoam®, SuperLight Foam is made with [Braskem's I'm green™](#) bio-based EVA (a carbon negative, sugarcane-derived green EVA). Our SuperLight Foam is created via supercritical foaming, a process in which gas is infused into the midsole to form its shape by way of autoclave pressure, reducing the amount of foaming additives needed which tend to have a higher carbon footprint. By combining the bio-based materials with supercritical foaming, we're able to deliver a foam that is incredibly lightweight and carbon neutral in its final form.

---

<sup>1</sup>The carbon intensity of the methane-capture bioplastic was provided by Mango Materials and is based on a third party Life Cycle Assessment (LCA) of their future commercial-scale facility with adjusted inputs to represent the demonstration-scale facility where the raw material for the M0.ONSHOT design prototype revealed in June 2023 was produced.

03

# PACKAGING

+

RECIPE BOOK



# Packaging

We plan to pack MO.ONSHOT in a bag made with Braskem's I'm green™ bio-based PE (sugarcane-based polyethylene). This way of packaging comes with many benefits:

- Like all Allbirds packaging, it can be sent by mail without the need for another box.
- The sugarcane-based polyethylene is carbon negative and incredibly lightweight.
- Lastly, the look is visually unique, functional and collectible.



## Where We Need You

This Green PE packaging is technically fully recyclable and can be mixed in with traditional petroleum PE without any loss of quality (which is rare in bioplastics). **But**, many recycling programs aren't ready to accept thin film plastic. With more customer demand, recycling service providers would be more incentivized to adopt the latest recycling technologies that can handle these thin film plastics.

We'll be refining our packaging all the way up until launch, so if you want to help us pilot the packaging and work out any kinks alongside us, you'd be very welcome.

04

# MANUFACTURING

+

RECIPE BO.OK

# Manufacturing

The majority of our carbon footprint is driven by the energy we use in any way, shape, or form. That's why responsible energy is a key pillar of our [Flight Plan](#) (what we call our sustainability strategy). As part of our reduction initiatives, we've committed that by 2025, we will use 100% renewable energy for our finished good manufacturers.

In line with that commitment, we've procured renewable electricity to power the manufacturing of M0.ONSHOT through the use of Renewable Energy Credits (RECs). These RECs are region-specific, ensuring that the carbon reductions from this renewable energy can be accurately allocated to the manufacturing facilities where M0.ONSHOT is made.



## Where We Need You

More than any other section of this toolkit, this is where collaboration can take us forward. Because we're a smaller company, we don't use much energy, and the energy we do use is spread worldwide. We also don't own the factories that make our products, so our suppliers drive most of our total energy use. Our primary option is to buy Renewable Energy Credits (RECs). RECs are not the only solution but an effective tool for companies on the path to a lower carbon future. Along this journey, we're always looking for ways to collaborate – whether it's using our voice to advocate or renewable energy policies or opportunities to support onsite solar or power purchase agreements.



05

# TRANSPORTATION

+

RECIPE BOOK

**Transportation** can be a particularly carbon-intensive part of a product's lifecycle. It's not as simple as paying your friend with an electric car to take shoes from 'point a' to 'point b.' So to get M0.ONSHOT from farm to foot in the most planet-friendly way possible, we've established a carbon-conscious transportation plan. We're planning to use biofuel-powered ocean shipping and electric trucking. Sorry, no rocketships.

## Ocean Shipping

Allbirds prioritizes ocean shipping to get our shoes from the factory to our distribution centers around the world. In 2022, we massively increased our ocean shipping (we're up to 96%), which directly delivered an 8% reduction in our per-product carbon footprint. (You can learn more about our carbon reduction in our [2022 Flight Status](#), if you want to go down the 'Birds rabbit hole.)

With M0.ONSHOT, we plan to continue working with our partner, [GoodShipping](#), to decarbonize ocean shipping emissions through the use of waste or residue-based biofuels. These biofuels replace traditional fossil fuels and are an important tool in reducing emissions from petroleum oil and gas, and subsequently, their harmful environmental impacts.

Historically, companies have had very little influence on shipping companies' fuel choice. GoodShipping is changing that by offering companies the opportunity to contribute to emissions reductions by funding sustainable fuel for shipping.

To be completely transparent with you, it doesn't mean that the fuels we support are always used in the exact same ships that carry our containers. But GoodShipping ensures the reduction is achieved by fueling a vessel that would normally run on fossil fuel with the volume of sustainable biofuel that reduces the same amount of emissions as our shipments would have contributed. GoodShipping's calculations and reduction methods are reviewed and verified by an independent third-party partner, ensuring that the overall impact on the atmosphere remains the same. So, it's a comprehensive approach to reducing emissions.

## Electric Vehicle (EV) Trucking

For the first time, we're planning to incorporate the use of electric trucks in our supply chain to transport M0.ONSHOTs from ports to distribution centers. These electric vehicles run on batteries, eliminating the tailpipe carbon emissions and particulate pollution associated with traditional fossil fuel-powered engines. This means a lower carbon footprint and cleaner air, which we consider to be a pretty big win-win.

To start, we're planning to implement this EV trucking mode of transport at the Port of Long Beach, where the infrastructure is available, and aim to expand our use of electric trucks in our supply chain over time.



## Where We Need You

One thing we've found tricky is establishing a global network of sustainable transportation options, particularly EV trucking. We're dialed in in the U.S., the hub of our operations, so perhaps we're just missing something? That's where you come in.

The more demand there is for EV trucking, the more suppliers will switch to a better option for the planet—and, frankly, a better option for our businesses' bottom line, too, if we all join forces.

Let's stop being dictated to. This doesn't have to happen to us. Join us in a coalition for sustainable transportation across the world. Plus futuristic delivery vehicles are just cool, no?

06

# END-OF-LIFE

+

RECIPE BOOK

# End-Of-Life

## Where does a product go when it dies?

The straightforward answer is... well, that it's not as straightforward as we'd like to think.

When calculating a product's carbon footprint, we include the emissions associated with the product's end-of-life. That means we account for a 100-year timeframe for the life of the materials used in the product, in line with industry standards. Because it's difficult to guarantee where a product will be in a century, in our calculations, we make the assumption that it will ultimately end up in a landfill and/or be incinerated. That end-of-life carbon footprint 'penalty' is built into our M0.ONSHOT calculations.

But that doesn't answer the question: **what's the best way to handle a product when you're done with it?**

Recycling is often considered the ideal outcome. That's not completely untrue... but it's also not entirely true. Oftentimes, items collected in recycling bins are not recycled because of contamination, complications, or a lack of demand for recycled materials. Those items end up being incinerated, deposited in landfills, or washed into the ocean—all of which defeat the purpose.

Some organizations have taken recycling into their own hands by inviting consumers to mail back used products to be recycled and repurposed. And while this is a more direct and controlled approach to circularity, even still, materials oftentimes cannot be recycled effectively due the challenges of taking the shoes apart and the resulting loss of quality. Then there's the carbon impact that comes with consumers shipping products off to be recycled and re-processed into something new. To make sure these efforts are really moving us

forward in the fight against climate change, we need to be intentional with what problem we are trying to solve—and that means not losing sight of carbon impact.

We've taken another approach via our [ReRun](#) program, our online marketplace of gently used Allbirds, which allows us to extend the life of our shoes by finding them a new home. Folks trade-in their Allbirds to receive a credit; shoppers can purchase those products on our online marketplace; and the shoes live to walk another day. More and more brands are starting these sorts of programs, which gets us really excited. But a question mark still remains on what to do with products that aren't lightly used and are, well, more well-worn.

If you're still reading this: we don't have a perfect answer. Sorry to bury the lead.

End-of-life is a bit of a conundrum. So as nice as it would be to say, "Ship your used product HERE and we'll make it new again," we aren't certain just yet what end-of-life approach we'll opt for with M0.ONSHOT. Regardless, we've already accounted for the end-of-life emissions in our carbon calculations, so we're going to spend a lot of time and brainpower to make sure we get this right. And you can bet that we'll always keep our eye on the footprint.



## Where We Need You

Share your end-of-life suggestions, experiences, and expertise. Be a thought partner as we consider different outcomes for M0.ONSHOT.

07

# CARBON MEASUREMENT AND LABELING

+

RECIPE BOOK

# Carbon Measurement And Labeling

Carbon is hard to measure and communicate. We could talk about the reasons why—maybe because so few companies make their per-product carbon footprint known, there’s a disconnect in consumer understanding, ongoing legislative developments, or a general lack of points of comparison. Just to name a few...

But imagine if understanding a product’s carbon footprint was as universal as seeing calories on a nutrition label. Just like you can see the calories in your chocolate bar, you could see how much carbon the lifecycle of a product emits, and use that information to make buying decisions that are better for the planet.

To hold ourselves accountable in our mission to lower our carbon footprint, we’ve been using our Life Cycle Assessment (LCA) Tool since our early days to calculate product carbon footprints and we’ve labeled each item accordingly since 2020. The Allbirds LCA Tool is third-party verified against the requirements of ISO 14067, which specifies principles, requirements and guidelines for calculating the carbon footprint of a product. MO.ONSHOT prototypes’ carbon footprints are calculated using this same tool, with modifications to account for on-farm sequestration (see more about this below).

The LCA calculation accounts for 5 phases included in a “cradle-to-grave” life cycle assessment for a product:

<b>Materials</b>	<ul style="list-style-type: none"> <li>• Production and extraction of raw materials, including waste</li> <li>• Material processes that occur before Tier 1 factory, which may include yarn formation, textile formation, preparation, coloration</li> <li>• Packaging</li> </ul>
<b>Manufacturing</b>	<ul style="list-style-type: none"> <li>• Manufacturing processes that occur at Tier 1 and strategic Tier 2 factories, which may include molding, cutting, stitching, and product assembly</li> </ul>
<b>Transportation</b>	<ul style="list-style-type: none"> <li>• Raw materials, primary textiles, and materials transportation to Tier 1 factory (if not included in materials phase)</li> <li>• Product transportation from Tier 1 factory to distribution centers</li> <li>• Product transportation from distribution centers to customers, including returns</li> </ul>
<b>Product Use</b>	<ul style="list-style-type: none"> <li>• Customer care, including washing and drying product over lifetime</li> </ul>
<b>End-Of-Life</b>	<ul style="list-style-type: none"> <li>• Final disposal of products after use</li> </ul>

But, here's the important part:

## **Our LCA tool is available to everyone. And we'd really love for you to use it.**

You can start by [stealing our spreadsheet](#).

We use it to calculate the carbon footprint of our products, identify hotspots, and drive emissions reductions. We've partnered with suppliers, consultants, and industry groups to populate this spreadsheet with data that is specific to our supply chain.

If the spreadsheet feels like a scary place to start, we get it. So we developed a [helpful manual](#) to make it as easy as possible for you to start calculating carbon footprints. You'll find tips and tricks on how to factor in emissions from materials, manufacturing, transportation, consumer use, and end of life.



## **Where We Need You**

This toolkit is a work in progress, like M0.ONSHOT. There are no silver bullets out there, yet. So, please, use it. Feedback on it. Critique it. Poke holes in it. Help us develop it to become an industry-wide standard.

Because knowing a product's carbon footprint should be as easy as knowing calories in a chocolate bar.



08

# CARBON SEQUESTRATION

+

RECIPE BOOK

# Carbon Sequestration

Growers worldwide are making great efforts to maintain and drawdown carbon. But currently, it's uncommon to have data for the carbon sequestration of a specific farm – heck, it's even hard for brands to know where their material is coming from. Even when all of that data is available, **few systems exist to give growers credit for practices that draw down carbon.**

So to capture a more comprehensive carbon picture, we've accounted for on-farm carbon emissions and sequestration in the carbon footprint of M0.ONSHOT. While this approach is not fully aligned to ISO 14067, we believe this wool carbon intensity value captures a more comprehensive model of the total emissions fluxes happening on-farm.

We believe **this is a necessary step if we are to incentivize a shift towards regeneration and support changes being made on farms today,** and it's one that we are proud of supporting.

Lake Hawea Station in New Zealand—where we've sourced wool for the M0.ONSHOT project—is affirmed to be a “net carbon zero” farm, meaning it sequesters more carbon than it emits. That's largely thanks to LHS' development program and best in-class practices in infrastructure, native plantings, land management, and more (read more about their work [here](#)) – all contributing to the realization of carbon negative wool, and subsequently, M0.ONSHOT's 0.0 kg CO<sub>2</sub>e footprint.



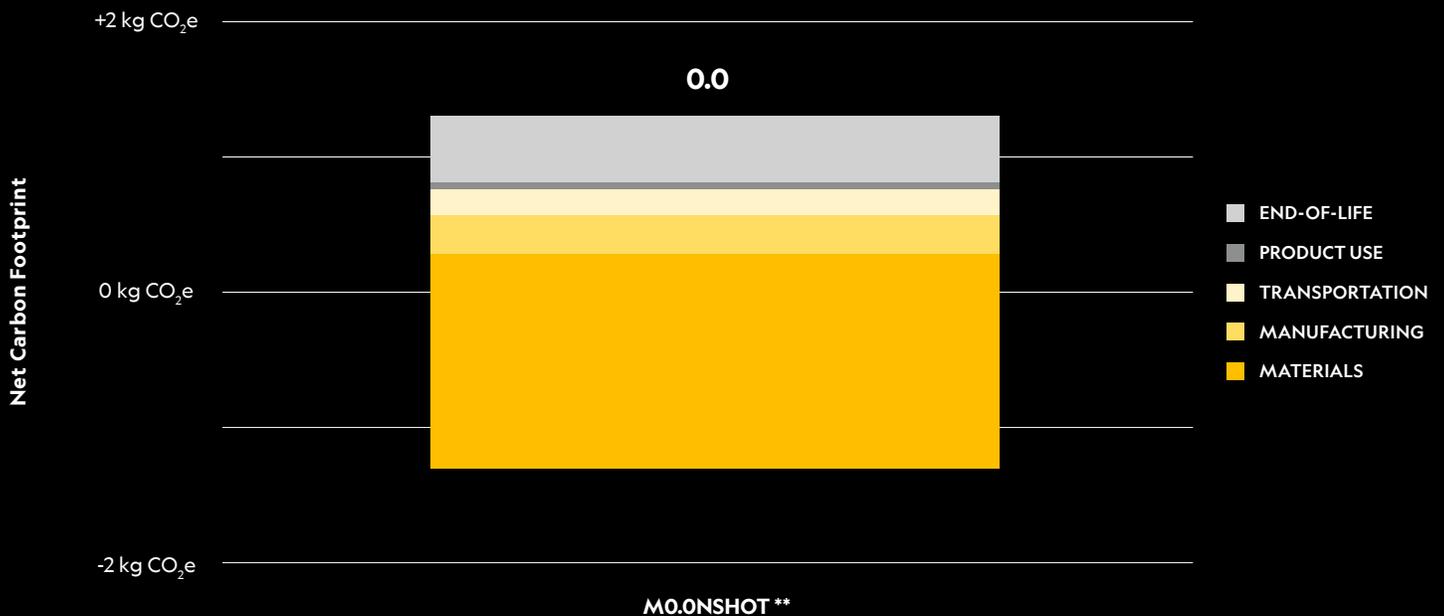
<sup>2</sup>LHS received Toitū net carbonzero certification, based on greenhouse gas emissions measured from July 1, 2019 to 30 June 30, 2020 in accordance with the requirements of ISO 14064-1:2006.

Here’s how we accounted for carbon sequestration data and arrived at a carbon negative assumption for wool that will be used in M0.ONSHOT:

- First, we started by working with The New Zealand Merino Company’s regenerative wool program, ZQRX, to source M0.ONSHOT’s wool from Lake Hawea Station.
- Second, we calculated the specific farm-level carbon footprint of Lake Hawea Station.
- The organizational carbon footprint that forms the starting point for the allocation was developed independently of this project and verified by Toitū Envirocare, a New Zealand-based B Corp and carbon certification business.
- Then, we collaborated with The New Zealand Merino Company to translate this farm footprint into a product-level wool material carbon intensity for M0.ONSHOT.
- This new wool carbon intensity is used to calculate the product’s carbon footprint using the Allbirds Life Cycle Assessment (LCA) Tool, with modifications. The initial Allbirds LCA Tool was third-party verified against the requirements of ISO 14067, which specifies principles, requirements and guidelines for calculating the carbon footprint of a product.
- The carbon footprint of M0.ONSHOT accounts for on-farm carbon sequestration, in addition to emissions, which is a deviation from standard industry practice. As a result, the calculated carbon footprint for M0.ONSHOT, unlike Allbirds’ standard products, is not fully aligned to ISO 14067. However, Allbirds believes this wool carbon intensity value captures a more comprehensive model of the total emissions fluxes happening on-farm.

### M0.ONSHOT Net Carbon Footprint\*

Allbirds has created the world’s first net zero carbon shoe, the M0.ONSHOT. Its landmark carbon footprint of 0.0kg CO<sub>2</sub>e is achieved without relying on offsets. That’s because, while some elements of the shoe’s creation emit carbon, others capture it, bringing the final product to net zero.



\*Net product carbon footprint as of June 2023. This calculation includes assumptions for commercial plans that are not fully reflected in the on-stage prototype shown at the Global Fashion Summit, notably packaging and 100% ocean shipping. Refer to discussions of each carbon footprint category in the RECIPE BO.OK. \*\*The Carbon footprint is calculated using Allbirds’ Life Cycle Assessment (LCA) tool. M0.ONSHOT’s net carbon footprint is based on the Allbirds LCA tool and modified to account for on-farm carbon sequestration.



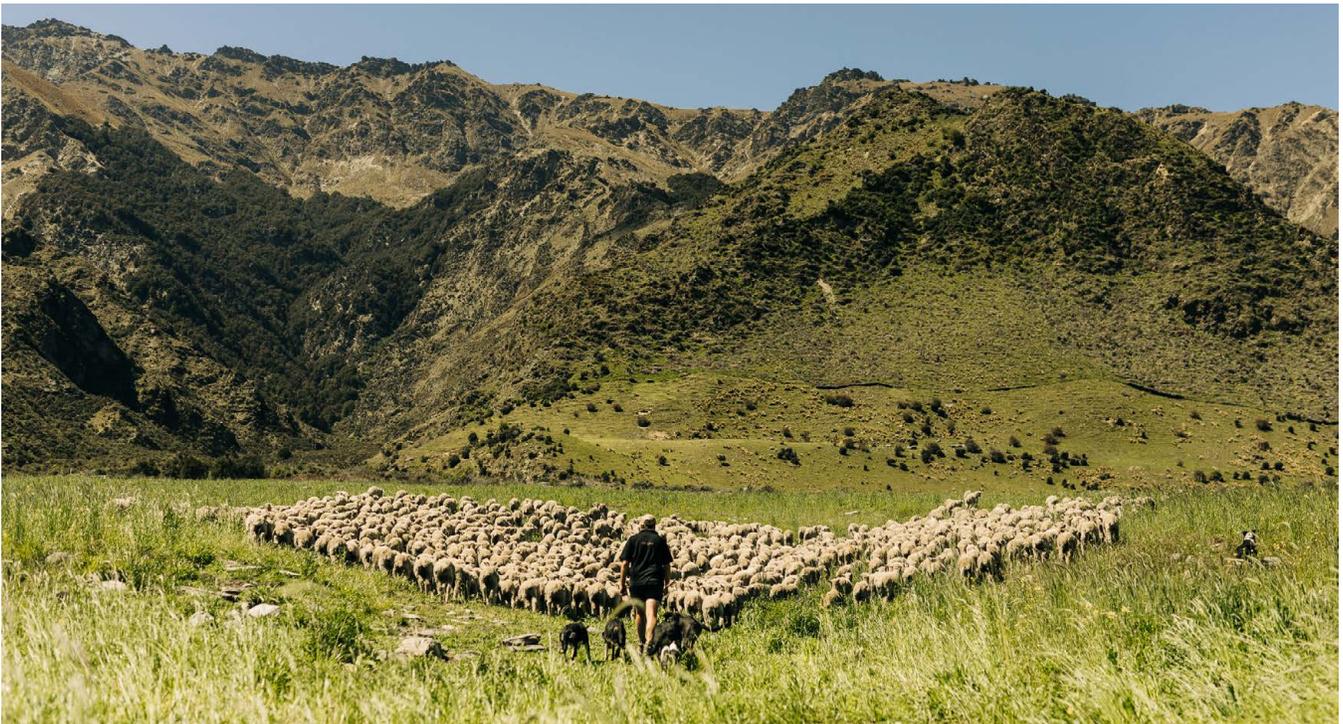
## Where We Need You

Let's be real. This is the controversial bit of our calculations. And 'controversial' might be slightly dramatic. It's just 'new' or 'different'. But, as forward-thinking, progressive individuals, we all know that neither of those things should be scary. And ultimately, we hope that M0.ONSHOT encourages dialogue, exploration, and pushing the boundaries of how brands think about collaborating with all the partners that help make our products a reality.

This is not just about one shoe. And this certainly isn't just about Allbirds. This is about reinvigorating the way supply chains work. Right now, this level of transparency and detailed analysis is uncommon... but it shouldn't be. This methodology to account for carbon emissions and sequestration is new now, but we hope for a future where this is the standard. Because ignoring the enormous efforts made by growers to capture carbon doesn't move us in the right direction.

So the ask here, again, is to join us. Use our new methodology. Engage in dialogue with us. Help us build it together.

Our mission is progress over perfection. With your help, we can go further.



09

# OUR PARTNERS

+

RECIPE BOOK

# Our Partners

Our wings can't take us all the way to the moon. It takes an entire crew. So we phoned some friends – a whole bunch, actually – to make this project possible. Simply put, without their help, we could not bring MOONSHOT to planet earth.

So as you consider how you might achieve a moonshot of your own, we highly suggest collaborating with any or all of these amazing organizations:

## **The New Zealand Merino Company**

info@nzmerino.co.nz

## **Lake Hawea Station**

finn@lakehaweastation.com

## **Mango Materials**

info@mangomaterials.com

## **Braskem**

imgreen@braskem.com

## **GoodShipping**

info@goodshipping.com

To reach the Allbirds Flock,  
email: moonshot@allbirds.com



[allbirds.com/moonshot](https://allbirds.com/moonshot)

*allbirds*