

FROM MARGINAL GAINS TO A  
**CIRCULAR  
REVOLUTION**





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AND  
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# PROLOGUE

On a beautiful morning in July a couple of decades ago, the heat of the French summer warms the legs of the riders awaiting the start of the first mountain stage in the Alps. It is the morning of the queen stage of the Tour the France that year.

The fatigue in the legs of the riders has built up in the days leading up to this daunting 254km stage from St Gervais to Sestriere. It is one of the first days since the start of the Tour de France almost two weeks ago that the sun is out. The riders have had an exceptionally cold and rainy Tour so far, and to make things worse, the pace has been extremely high in stages that felt longer than normal. Both riders and staff are suffering.

Many complain about the enormous distances that need to be covered, not just during the stages but also in the transfers between them. This year's Tour takes the riders through no fewer than seven European countries in three weeks: 3,983km in 21 stages. Spain, the first country, hosted the prologue and a couple of stages. Next up was a team time trial and another couple of stages in France, all before the riders rode from Roubaix to Brussels over wet and slippery cobbles. Then from Belgium to the Netherlands and onwards into Germany.

The individual time trial of over 65km in Luxembourg resulted in the first serious time gaps in the general classification, but still none of the favourites is wearing the yellow jersey. New names in the peloton challenge the older generation with relentless attacks; the older generation retaliates with the same strategy. Only one man keeps his cool, as he has done over the many stage races he won in the years leading up to this Tour.

Now, after twelve stages, it is time for the first proper mountain stage. With 254km and five climbs (one of the 2nd category, three of the 1st and one hors catégorie) it's a good thing the sun is out. Exactly 40 years before, the legendary Fausto Coppi won this same stage. That victory inspired a young Italian rider. He attacks on the first climb for a monster solo of over 245km. The young Italian is Claudio Chiappucci. He has been wearing the polka dot jersey for the best climber since the day he earned enough points to take the jersey in stage 9. He took it off another young rider's shoulders, the Frenchman Richard Virenque. Virenque is on his debut Tour, got the jersey after the second stage, and is already destined to become a French national hero.

Chiappucci increases his lead in the polka dot ranking to an enormous gap by taking full points on every single climb of the day. The crowd lining the final climb to Sestriere goes crazy, running alongside Chiappucci. With just over a kilometre to go, Chiappucci has to push motorbikes and spectators to get them out of his way and reach the top, hanging on to his ever-decreasing lead over Miguel Indurain – the unbeatable star rider of this era. His unbelievable 245km solo delivers him the most impressive win of his career – and a second place in the general classification, behind the new leader, Miguel Indurain.

The next morning no fewer than eighteen riders abandon the race, with Indurain wearing the yellow jersey again for the first time since the prologue. He would take the yellow jersey to Paris in what would be the second of five consecutive Tour de France wins for the Spanish rider.

The year was 1992, a time when few riders were wearing helmets and carbon fibre frames were a novelty, slowly replacing the steel framesets that had been part of the peloton's gear for so many decades. Shifters integrated into the brake levers were a recent innovation – Shimano had introduced the Dura Ace 7400 Dual Control Shifters in 1990 and Campagnolo launched the Record 8 Speed Ergopower in late 1991. For the mountain stages, some riders still preferred the levers mounted on the downtube of the frameset to save a few grams.

The queen stage of the 79th edition of the Tour de France took place a little over a month after 154 nations signed the UNFCCC – the United Nations Framework Convention on Climate Change at the 1992 Rio de Janeiro Earth Summit. The Cold War had ended the previous year with the collapse of the Soviet Union. The approximately 5.5 billion people living on planet Earth were no longer divided by an East-West conflict. It felt as if the world was coming together again, embarking on a new and peaceful future with global opportunities resulting in lower poverty levels all over the world, as well as a better environment.

World leaders like the US President George H.W. Bush, UK Prime Minister John Major and Cuba's leader Fidel Castro were all present at the Earth Summit and made promises that they would act on issues such as toxic waste, air pollution, water use and fossil fuels. For the first time in history, a vast majority of countries agreed that it was required to 'stabilize the emissions of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.'<sup>1</sup> In everyday language: it was necessary to make sure greenhouse gas emissions caused by humans would not lead to climate change beyond a safe level.

Since 1992, when Miguel Indurain won his second Tour de France, a lot has changed – generally for the better. The number of people living in poverty has dropped from some 34% to less than 10% of the world population,<sup>2</sup> even though the latter surged to approximately 7.8 billion people by 2020.<sup>3</sup> With the increase of population and wealth, the market for bicycles grew as well, meaning that more people enjoy riding a bike than ever before.

However, there is also a downside. Population growth and increased wealth have taken their toll on the environment. We are living in what we call a linear economic system, where we use finite sources of materials and fossil fuels to make products and send them all over the world to consumers. We often use these products only briefly before they end up in a landfill, in an incinerator or, worse, in the soil or the oceans. The production processes, transportation and use of the products cause emissions and pollution. In a linear economy, We Take, Make and Waste.

Because of the growth in population and wealth, our factories use ever more resources to produce ever more goods, generating ever more waste. Air quality is poor in many of the world's cities. We consume more energy than at any time before to heat and cool our buildings and to move goods and people across the planet. Global CO<sub>2</sub> emissions have not stabilised since 1992; instead, they have continued to rise. As a result, average temperatures in the 2010s were about 0.5°C above those of the 1980s. Extreme weather conditions and natural disasters have increased in frequency and intensity, just as forest fires have.<sup>4</sup>

The 1992 UNFCCC can be seen as a starting point for change, which has been slow to gather momentum. This is partly because it has taken time to produce sufficient evidence that climate change is really happening, required to convince politicians, business and citizens that they need to act. Citizens now use their votes and their wallets to demand change. And more and more companies see they need to change to avoid a backlash from regulators, to save costs and to gain a competitive advantage in a market with new customer demands.

Electricity produced from fossil fuels is increasingly being replaced by electricity from renewable sources such as the sun and wind. Sales of electric cars show double-digit growth in a number of countries, most notably in China where some 1.4 million electric cars were sold in 2019, compared to almost zero in 2014.<sup>5</sup> More and more manufacturers are eager to look for alternative production materials, reduce their energy consumption, and reuse components to make new products.

Most of them may have noble intentions in doing this, but even if they don't, they no longer seem to have much of a choice. Regulation is getting stricter; big economic blocs such as the European Union present real plans with real targets.

## The EU wants to be climate neutral and have a 'circular economy' by 2050:

*'In 2050, we live well, within the planet's ecological limits. Our prosperity and healthy environment stem from an innovative, circular economy where nothing is wasted and where natural resources are managed sustainably, and biodiversity is protected, valued and restored in ways that enhance our society's resilience. Our low-carbon growth has long been decoupled from resource use, setting the pace for a safe and sustainable global society.'*<sup>6</sup>

How exciting is that vision of the planet in 2050? And how would it translate to the world of cycling?

Imagine a bike that has been made from plant-based materials or recycled and reused parts, and that the material wearing from your tyres or brake pads is biodegradable. The lubrication washing down from your chain no longer pollutes the forest you are riding through, but provides valuable nutrients for the plants in it. Sensors tell your cycling computer about the state of the components and warn you when and how to maintain them. You no longer discard your old bike as if it were a piece of rubbish, but return it to the manufacturer so that parts and materials can be reused to make new bikes; the condition of the components has been monitored by the data sensors and collected in the bike's own bike passport. Or, alternatively, you could plant your old bike in your garden for it to become part of the circle of life again.

You would be living in a world with a circular economy. A world where you ride your bike in an environment without pollution. Through forests larger than today, inhabited by ever more varied species of plants and birds. A world where CO<sub>2</sub> emissions no longer contribute to climate change and we no longer dig up finite resources from the Earth, but use our 'waste' or renewable natural sources to make new products.

This vision of a Circular Cycling Industry is what drives us. To make the transition from our current linear economy of ‘Take, Make and Waste’ to a circular economy, marginal gains are not sufficient. We will have to change the way we design products, business models, and the interaction between manufacturers and the users of products.

This book is a practical guide to help the world of cycling make that transition. We hope to inspire people in the cycling industry, designers, business developers, marketeers, event & race organisers and governing bodies, as well as riders, to transform the way we think about bicycle design and the use of a bicycle.

The cycling industry has proven to be a very innovative industry, able to deliver better products every season by teams based all over the world. The supply chains are truly global: design is done all over the world, manufacturing mainly in Asia, customisation closer to the customer. The internet makes it possible for brands to interact directly with consumers, who now no longer rely solely on their local bike shops to buy bikes and parts.

Bike innovation has made a huge difference: road bikes have become more reliable through better component design, testing and manufacturing methods. Shifting and gear ratios have improved, ergonomics of handlebars and saddles have made riding a bike far more comfortable, making the road bike accessible to more and more people across the globe. In fact, the design of the road bike has reached such a high level of maturity that the number of radical breakthroughs has been very limited in recent years. It is no coincidence that the term ‘marginal gains’ has been introduced in the industry, since you now need a lot of tiny steps to make a difference. It is a fitting expression, not just for the way (pro) riders become better riders, but also for bike design these days.

However, the industry’s focus on standing out by introducing marginal innovations in order to sell more products, and sell them faster, is no longer sustainable. This approach causes too much waste, as more and more products will cease to be used and eventually discarded before they have reached the end of their technical lifespan.

The transition to a circular economy offers an enormous opportunity for bicycle brands to make a big step in product design and in their interaction with customers. It requires the introduction of radical innovations, leading to a larger market share for the most innovative companies. Some readers might remember how the race bike has evolved since the steel bike Indurain rode in 1992. In the 1990s and early 2000s, cyclists all over the world eagerly awaited the innovations every brand would introduce in next year's models. Innovations that really made a difference in bikes' performance and gave consumers a real choice in what to buy.

The introduction of bicycles for a circular economy will be just like that: exciting, with a lot of new products and services to choose from. There will be successes and there will be failures. Bikes will be better – not just better to ride, but better for our planet and our societies. It is time for the cycling industry to adopt business models and product designs that no longer deplete natural resources, cause pollution and CO<sub>2</sub> emissions, and leave so many high-tech materials to end up in a landfill or an incinerator.

**To get there, we need much more than marginal gains, we need a revolution.**





# THE ROADBOOK TO A REVOLUTION

In your shed or attic there is a Box, a box filled with bike parts. They used to be on one of your bikes, or you bought them as spare parts but never used them. Maybe you got parts from a friend, because, you know, they might come in handy one day. The parts are too good to just throw into the bin, but deep down inside you know you will never use them again. Then you move to another house, you come across the Box and have to decide what to do with it.

With a bit of nostalgia, you go through the parts: 'Remember, that beautiful and super durable Chris King NoThreadSet™ that has survived three of my bikes? And – oh wow, back then I had several pin-ups to put on my Cinelly stem just like Mario Cipolini. And here is a 9-speed chain that I bought as a spare but that does not fit on my current bike anymore.' In the end, you decide to get rid of the parts, because after years in the Box they are no longer compatible, technically outdated or simply out of fashion.

Does this sound familiar? Think about it for a minute. Is this really happening? Are you spending lots of money on stuff that you do not fully use and then discard, without considering the impact of your actions on our planet? You are not alone. Nearly all the cyclists (and shops, and distributors) we spoke to over the last few years have a Box. It is a typical symptom of the linear economy, where parts with a considerable remaining technical lifetime are stored, and eventually thrown away because new parts have replaced them.

## UPCYCLES

Our dream is to ride the ‘bike of the future.’ One that adds nutrients to nature while we ride; a bike built without finite resources and without waste that ends up in the environment.

In the 1990s, we both started mountain biking as teenagers. Our local single tracks were full of sticky mud that caused our bikes to wear very fast, but we had no money to have our bikes repaired or to buy new parts. We learnt to maintain and repair our bikes early on, simply because we could not afford to buy replacement stuff all the time. Being bike nerds, we enjoyed the era of rapid improvements in bike technology. We worked in bike shops alongside our studies, spending every euro we earned on our bikes to make them better, or to buy another one.

Even after finding full-time jobs, we kept riding our road, gravel and mountain bikes. We also continued our conversations about the way the cycling industry works, influenced by what we learnt every day – Matthijs as an IT manager inside the industry and Erik as an innovation manager outside the industry. In the late 2000s, sustainability became an important part of the strategy of many companies, initially aimed primarily at reducing negative impact. Erik got involved in some of the first projects in the Dutch construction industry that were based on ideas about a circular economy, where reducing environmental impact and making money go hand in hand.

In 2018, we decided that just talking about how the cycling industry was not picking up this trend was no longer good enough. We decided to act, and founded Circular Cycling, a commercial start-up aimed at transforming the waste in the Boxes into potential resources. It was an experiment to test a few tiny first steps on the road towards a circular economy: we built and sold UpCycles – new bikes made from used parts. At first, we used the parts that came from our own Boxes, then from numerous other Boxes.

Each and every UpCycle was unique, as we had the opportunity (and needed) to mix and match parts and framesets in a way we thought

fitted best together. We mounted new handlebars (safety first!), bar tape (someone else's sweat doesn't really feel new does it?), cables and comfy 25mm tyres on each bike. Drivetrains were checked for wear and replaced when too little life was left in them. Once finished, the 'refurbished' road bikes were offered to consumers for prices some 30%-50% lower than you would pay for a new model with the same ride quality.

We made many mistakes and were in no way a perfect example of a truly circular or sustainable company. We eventually stopped building and selling the UpCycles, because we ran into the limitations of using products that are designed for a linear economy in a circular business model. However, we did learn many valuable lessons about the complexity of the cycling industry. Our experiments showed us how a transformation of the current linear system into a circular cycling industry could look like.

To realise our dream of a circular cycling economy, we found that the entire industry needs to change. We share our insights in this book because an experiment in a small shop in the Dutch city of Utrecht is not a revolution. For a revolution to happen, small initiatives like ours that are already happening all around the world, need to connect with each other and with new initiatives to create enough momentum to start a revolution on a global scale.

## A CIRCULAR BUSINESS MODEL INCLUDES THE ENTIRE SYSTEM

We talked to many people as part of our research for this book, including publishers and marketeers. Almost everyone asked us who would be the target audience of this book. 'Are you targeting readers looking for a management book about business or engineering? Or a book about cycling? Is it about sustainability?' The answer is yes – to all those questions. Most people told us that we needed to focus, 'target one group' they kept telling us. But if you want to change a complex system like the cycling industry, we believe that you need to address it in its entirety.

Bike and parts designers, manufacturers and their shareholders, marketers, rule makers (the UCI and National Federations), event & race organisers – they are all part of the current linear industry model, making profits in a way that has been perfected over decades. And cyclists (let's not forget the consumers!), who ultimately make the decision what to buy, when to buy and how to take care of their gear when they go out on the road. They might not feel it that way, but they too have an enormous impact on the way the industry works.

**The good thing is that all these different groups have two things in common:**

1. They are all human beings who can make a difference if they want to: they can all make a conscious decision on what to design, how to invest and what to buy. Or on how to set rules for the future technical (or maybe ecological?) requirements of a bicycle competing at, say, the 2028 Los Angeles Olympics.
2. They all live on the same planet with its limited resources and changing climate.

In this book, we have tried to address all the stakeholders in the cycling industry, and therefore to avoid too much cycling and circularity jargon. Some bits might be more interesting to you than others, depending on your role in the system (for example on whether you are a cyclist with an interest in sustainability or a designer of framesets).

## HOW TO READ THIS BOOK

The information we present in this book is a mix of the experience we gained getting our hands dirty building our UpCycles, but also designing circular products in the construction industry, training companies on circular business models, as well as managing the IT of a bike distributor, and developing online databases for digital product information. We have included relevant scientific research done by others on topics such as circular economy and climate change.

This book is like a one-week stage race: the preceding prologue will be followed by five stages, all with a different character. A book short enough to race through, but long enough to see the landscape change along the way.

- STAGE 1** THE COMPLEX WORLD OF CYCLING AND SUSTAINABILITY
- STAGE 2** THE LINEAR CYCLING ECONOMY
- STAGE 3** CREATING VALUE IN A CIRCULAR ECONOMY
- STAGE 4** ACTION PLAN FOR A CIRCULAR CYCLING INDUSTRY
- STAGE 5** GETTING THERE
- FINISH** STAND UP FOR A REVOLUTION

We will present you with a mix of facts about the challenges resulting from a linear economic system, the way circular business models might work, and examples from inside and outside the world of cycling. After reading this book, you should have a better idea about a circular economy, what this could look like in the cycling industry and what you can do from your position in the world of cycling to contribute to the revolution.